THE BOOK OF KNOWLEDGE

132 Sewall St

LORD NELSON IN THE CABIN OF THE *VICTORY*

This picture by Charles Lucy shows Lord Nelson, in the full dress of an English admiral, seated in the cabin of the "Victory." Nelson was one of the greatest admirals the world has ever known. With the battle of Trafalgar ended all hope of France's resistance to England at sea, but Nelson lived just long enough to know that his great task was accomplished. He paid the price of the victory with his own life.

The Book of Knowledge

The Children's Encyclopædia

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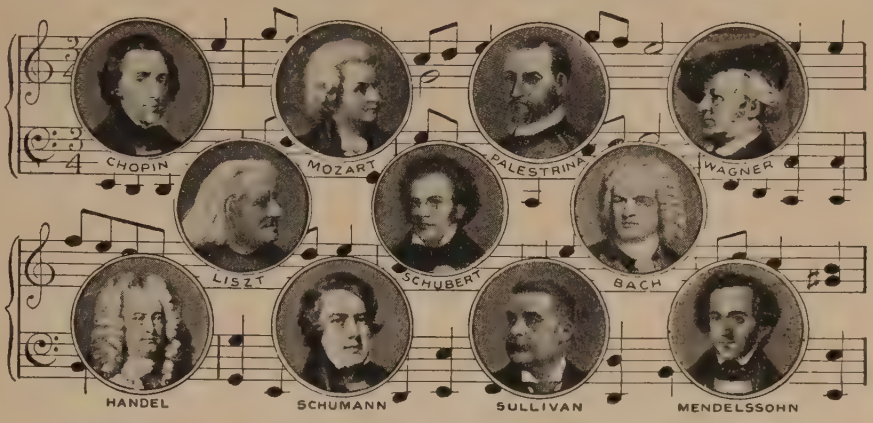

GREAT COMPOSERS OF MUSIC

CONTINUED FROM 3088

IT is rather curious that while the earliest times produced great writers of prose and verse, there were no really great composers of music until within the last three or four hundred years. The first composer treated seriously by the musical historians was Palestrina, who died in 1594. He wrote a Mass—that is, a musical setting of the Roman Catholic Church service—which the Pope thought so fine that he ordered it to be taken as the pattern for all the future music of the Church. But Palestrina's music never took hold of the people. The first great composer whose music did that was George Frederick Handel.

Handel was a German, born at a little town called Halle, in 1685. His father was one of those seventeenth-century barbers who were at the same time doctors and dentists. And he had made up his mind that his son should be brought up in the profession of the law. But music was in George's blood, and nothing would check his ambition to be a composer. He smuggled a rickety spinet—an old-fashioned kind of piano—up to the attic where he slept, and at night, when all the others were in bed, he played and played, until he mastered the instrument. His father soon realised that it was no use keeping him back from his desire, so he procured him good teachers, and did everything that he possibly could to help him forward in his chosen art.

Well, in time Handel began to compose big works, mostly operas. But the operas had no great run on the Continent, so he came to London and settled down there. For long years he did almost nothing but write operas, and he generally rented a theatre of his own. He had some successes, but he had more failures; and, in fact, was twice bankrupt over his opera business. Yet, if Handel had not failed with his operas, we should never have had those grand oratorios by which we know him now. For he turned to oratorio when he had exhausted himself with opera. An oratorio is a long sacred composition for voices, the words nearly always taken from the Bible.

Somebody has said of Handel that he set the Bible to music. And he very nearly did. He wrote more than twenty oratorios, though not more than three or four of them are performed to-day. But one alone, of the three or four, would have been quite enough to immortalise the name of Handel; for it is to Handel that we owe "The

Messiah," heard all over the country every Christmas season. Just as we think of "Paradise Lost" when we think of Milton, or of "Robinson Crusoe" when we think of Defoe, so it is "The Messiah" that comes to our minds when we think of Handel. And he wrote it—this long work, which takes more than two hours to sing—wrote it, choruses, solos, accompaniments, and everything, in twenty-three days!

A GREAT GERMAN COMPOSER WHO IS BURIED IN WESTMINSTER ABBEY

Of course, he wrote other things that we like to remember besides his oratorios. Every young pianist plays his "Harmonious Blacksmith," for instance, and violinists and singers often have his name in their programmes. Sometimes, too, if we go to an organ recital, we shall hear a concerto of his. But, after all, he is *the* great composer of oratorio, with only Mendelssohn as a faint rival. The English are so proud of him that they like to claim him as English from his long residence in London. He was, indeed, a naturalised Englishman, and when he died, in 1759, they laid him beside their great men and women in Westminster Abbey, where we may see a monument representing him in the act of writing "I know that my Redeemer liveth" for "The Messiah." We may also see his house in Brook Street, Hanover Square. He had a fiery temper, used "bad words" sometimes, and once threatened to throw a disobedient singer out of the window. But he was pious and charitable too, and we like to know that he gave an organ, and much of the money he drew from his oratorios, to the Foundling Hospital. They have a new organ there now, but some of the original pipes of Handel's organ are built into it.

HANDEL AND BACH, WHOSE MAGNIFICENT MUSIC WILL LIVE FOR EVER

The greatest musician who was living in Handel's time was John Sebastian Bach. The two, Handel and Bach, are often spoken of as if they were a sort of Siamese twins of music. They were both Germans, and they were born within a month of each other. Both, again, were fine organists; both gave great religious works to the musical world; and both were stricken blind in their later years. Beyond that, they did not have much in common. Handel never married; Bach was a quiet, stay-at-home man, who married twice and had a family of twenty sons and daughters. He was an organist first of all, and his organ compositions, after all these years, are the most perfect things of the kind ever produced; and there is not a serious-minded organist in the land who does not think of Bach when he is going to give an organ recital. Bach is to the organist what Shakespeare is to the actor.

In this connection there is a little story that may be told. Bach lived in the time of Frederick the Great. Now, Frederick was musical; he played the flute very well, and he took a notion to have a visit from Bach. So Bach, then an old man over sixty, set out on the journey. The king was at supper when his arrival was announced. Springing from the table, Frederick broke up the meal with the words, "Gentlemen, Bach is here!" and took Bach, weary as he was with travel, through the palace. Bach played upon the piano, and improvised upon a little melody given him by Frederick. Then, at the end, he told Frederick that he *preferred the organ*.

THE GRAND OLD MAN OF THE ORGAN, WHOSE INFLUENCE LIVES TO-DAY

That was what Bach preferred; and we think of him mainly as the grand old man of that noble instrument, which we are constantly hearing in the churches, and musicians call the "king of instruments." It is not likely that we shall often hear Bach *outside* the churches. But let us remember this: that Bach has had a great and lasting influence on all the great composers who have followed him. All looked up to him, and took, as it were, their cue from his seriousness and his calm dignity. Beethoven was enthralled by his B minor Mass, which is occasionally performed. Mozart, by chance, listened to some of his compositions, and came away deeply impressed and wondering. Mendelssohn, Schumann, Wagner, Brahms—every one of them revered Bach as their godfather in music. So, while we may not hear very much of Bach's own music, we should never forget that we are as good as hearing it in the works of those who came after him. This wonderful genius died in 1750, nine years before Handel, who

Like most of the great composers, Haydn was very poor in his young days, and wandered about the streets of Vienna playing the violin to make a very precarious living. But later he became rich and famous, and it was in England that his greatness was first recognised. Here we see him on his way to this country watching and listening to a storm to which he afterwards gave realistic expression in his oratorios the "Creation" and the "Seasons."

Handel has been called the sublimest musical genius upon record. His father wanted him to be a lawyer, and removed all musical instruments from his house, but Handel, although only six years old, managed to get a clavichord—a small piano—conveyed to the top of the house, and upon this he practised secretly at night after the rest of the family had gone to rest. But at last he was discovered, and here the artist shows us the scene.

mourned for him as for a brother. So much for the first pair of great composers. Now we will take another pair—Mozart and Haydn. It has been remarked as strange that Bach and Handel, though they were born, both Germans, in the same year, and lived practically throughout the same period, never met. It was not so with Mozart and Haydn. They met often, and they were very fond of each other. It was Haydn who described Mozart as "the most extraordinary, original, and comprehensive musical genius ever known in this or any other nation."

That was a very generous tribute, especially as musicians are so often extremely jealous of each other. We will deal with Haydn first, for he was called "Papa" Haydn, so much did they love him in his own day. And we, too, for other reasons, may well call him "Papa." He was the father of most of the instrumental forms of music which are now regarded as *fixed* forms—the symphony, the sonata, the string quartette, and the like. That is to say, he wrote works in these departments which every composer feels to be the right models to follow.

THE POOR PEASANT BOY WHO BECAME THE FATHER OF MODERN MUSIC

That, in itself, was a notable thing to achieve. And it was particularly notable for a poor boy who had to go out into the world to earn his own living at an age when boys nowadays are at school, enjoying their games, if not their lessons. The parents of this great composer were humble Austrian peasants, and they were living in a wretched farmhouse of one storey, with a barn attached, when he was born, in 1732.

But Haydn had, at any rate, one advantage: his musical abilities, discovered in early childhood, were not thwarted by his father. The father arranged for the training of his young prodigy, and the young prodigy was taught his crotchets and quavers with many floggings when things went wrong. He developed a good voice, and so was sent to sing in the choir of Vienna Cathedral. But the day came when his voice "broke," and he was of no more use to the choirmaster, who might have kept him resting until his voice "set"; but Haydn had displeased him. One day he played a boyish prank on a fellow-singer by cutting off his pigtail, and now he was dismissed from the choir and left to provide for himself as best he could.

You would not like to hear of all the hardships he endured for long after this. He became a great singing teacher's servant; he played the violin at dances and even in the streets!

THE HAPPY DAYS OF HAYDN'S LIFE AND HOW HE WROTE HIS BEST MUSIC

But he was perfecting himself in composition all the time; and a set of sonatas that he wrote took the fancy of a wealthy countess, who procured him a remunerative engagement, and introduced him to pupils who paid well. Henceforward he had no trouble in getting on. In 1760 he married, not very happily, and a year later he entered the service of the Esterhazys, one of the richest Austrian families of the time. Great families kept a permanent band of their own in those days, and Haydn was the Esterhazys' bandmaster. The post gave him a good salary and a comfortable home, and he went on with his composition under the most favourable conditions.

That was until 1790, when the Esterhazy orchestra was disbanded. Then he went to London on a visit, and wrote for certain London concerts some of those symphonies which we still delight to hear. Altogether he wrote about 150 of these symphonies. Mozart saw him just before he left, and wept at the parting. "We shall never meet again," he said; and it proved true. In the music of some Church hymnals we find a tune called "Austria," with Haydn's name attached. It is almost as well known as "God Save the King"; and it was after hearing "God Save the King" in London that Haydn felt he must make a national tune of the same kind for his own beloved Austria.

THE TENDER HOMAGE OF ONE GREAT MUSICIAN FOR ANOTHER

He went home and wrote "God Preserve the Emperor," and then somebody made the air into the hymn-tune that we have sung so often.

And what else of Haydn's do we know? A good deal, I am sure. His symphonies are still played by our leading orchestras; his piano music is in all the publishers' lists; and his

GREAT COMPOSERS AT THEIR INSTRUMENTS

Mozart, seen here with his father and sister, was one of the most remarkable musical geniuses that ever lived. When only five he composed beautiful music, and at seven could play the most difficult works without a mistake.

The world has never produced another master of the organ like Bach. When he played, as shown here, his listeners almost heard the instrument speak. We owe our system of piano playing with all the fingers to Bach.

Mozart's later years were very sad. He had made very little money and had spent it all, and was constantly in debt. His health, too, was bad, and jealous enemies persecuted him bitterly. At last these things brought on an illness, from which it was evident he could never recover, and summoning a few friends to his bedside, he asked them to play over the magnificent "Requiem" he had recently composed. This they did, as shewn here.

The bottom picture on this page is reproduced from the painting by Kaulbach, by permission of the Berlin Photographic Company.

oratorio of "The Creation" ranks as a good third to "The Messiah" and "Elijah," of which latter we shall speak presently. Haydn wrote "The Creation" in his old age, and it was in listening to a performance of it that he made his last appearance in public. The excitement was too much for him. "Not I, but a Power from above created that," he cried out at one point. They carried him away, and as he passed, Beethoven, who happened to be there, bent down and fervently kissed his hand and forehead. It was a pretty and a tender act of homage.

Haydn's music is for the most part bright and genial, and even sparkling, with a dainty grace, and a constant melody, which was his most marked characteristic. Very superior persons will tell you that he toadied to princes and dukes and other important people, and wrote music merely for the moment. It is not true. Young people, at any rate, must always love Haydn and his music, for young people do not want to be made miserable when they play the piano or listen to the band. And Haydn will never make them miserable.

THE WONDER OF MOZART'S GENIUS AND HOW HE COMPOSED MUSIC AT FIVE

Neither will Mozart. Young people should take a special interest in Mozart, for Mozart was a distinguished musician at a more tender age than any of the other great composers. A young man once asked Mozart to tell him how to compose. The gentle Wolfgang Amadeus, for these were his Christian names, made answer that the questioner was too young to be thinking of such a serious occupation. "But you were much younger when you began," said the aspirant. "Ah, yes, that is true," replied Mozart, with a smile; "but then, you see, I did not ask anybody how to compose." No! Mozart was born in the city of Salzburg, in 1756, and he was only five when he composed a minuet and trio that boys and girls of much maturer age might play with some effect to-day.

His father was a good musician, specially expert as a violinist, and Wolfgang had a sister, Maria Anna, who, at first, showed nearly as much talent as himself. Hence they all—the father and the two children—started on a musical tour, in the course of which Mozart played before the Empress Maria Theresa, and romped with the little princess who afterwards became Queen of France—the unfortunate Marie Antoinette. These great ladies used to take him on their knee, and kiss him, and shower gold upon him. All the royalties, in England, made a darling of him and petted him greatly.

HOW MOZART BECAME POOR AND DANCED TO KEEP WARM

It was Mozart's happiest time, for, from the day that he began life in earnest as a married man—that was in 1782—the wolf of poverty was never away from his door. He composed incessantly, but even successful composition did not pay then as it does now, and the butcher and the baker were often worrying poor Mozart for a settlement of their accounts. A friend called one winter day, and found Mozart and his wife waltzing round the room. "We were cold," they said, "and we have no wood to make a fire." Let us think of that, and then think of the glorious works that Mozart produced under such depressing conditions. He left 769 compositions in all, and he was still under forty when he died.

In his own day he was regarded chiefly as a composer of opera, and we still think very highly of his "Don Giovanni," and "The Magic Flute," and "The Marriage of Figaro," though we seldom have a chance of hearing them. He wrote forty-nine symphonies, and conductors still like to have some of these played, particularly the so-called "Jupiter" symphony, and one in G minor, which has been described as his "tenderest and daintiest instrumental composition." All his works are full of charming melody, of which he had a fund only equalled by Haydn.

THE STORMY DAY WHEN MOZART WAS LAID IN AN UNKNOWN GRAVE

Mozart's end was very sad. He was taken ill in 1791, and during his illness he wrote a famous "Requiem," a sort of funeral song, which he had sung around his death-bed, to hear its effect. Then, on his funeral day, a great storm arose, and only the undertaker and his men went to the cemetery to see him buried. He died so poor that his remains had to be put into a pauper's grave, where many other coffins lay. Nobody looked near the grave for many years,

and then it was found that nobody could point it out. So Mozart's monument in that great Vienna cemetery stands over an empty grave, while the composer's dust reposes no one knows where. It is pathetic to think of such an end of a great man.

There was another great composer who went through very much the same sufferings, the same persecutions and fate as Mozart. His name was Franz Schubert. "My music is the product of my genius and my misery," Schubert said. It could hardly be otherwise. His people were poor, and he had eighteen brothers and sisters, from which we may judge that no special attention was given to his education and upbringing. But, just as "truth will out," so will genius. Schubert entered upon music as a prince enters on his dominions. When they began to teach him music, they found that somehow he had learnt the rudiments for himself.

He began to compose at eleven, and he consumed as much music-paper as would have made a small fortune for a stationer. He wrote all kinds of things at that time—overtures, symphonies, quartets, operettas, Church music, piano music, and so on. But now we remember him almost solely for his songs, and for a few orchestral pieces.

GERMANY'S GREATEST SONG-WRITER AND HOW HE COMPOSED A FAMOUS SONG

He is Germany's greatest classical song writer. He composed more than 500 songs, but, of course, only a small number of these are popular. The one we are most likely to hear is "The Erl King," the poem written by Goethe.

One afternoon Schubert took up a volume of Goethe's works lying on his table. He read "The Erl King." The rushing sound of the wind and the terrors of the enchanted forest were instantly changed for him into realities. Every line seemed to flow into strange, unearthly music as he read; and, seizing a pen, Schubert dashed down the song nearly as we know it. He got a great singer to sing it, and then a Vienna music publisher, who had hitherto declined to have anything to do with his songs, asked to have it. He paid Schubert a very small sum, though in a few months the publisher made $400 out of it. That was the way with Schubert all along. Some of his finest songs were sold for the price of a meal. Grinding poverty, slights, insults, disappointments innumerable—that was Schubert's portion. He died in 1828, before he was quite thirty-two, and they laid him to rest near Beethoven, at whose death-bed he had shed tears, with this inscription on his tombstone: "Music buried here a rich possession and yet fairer hopes."

THE MIGHTY BEETHOVEN, WHO WAS TOO DEAF TO HEAR HIS OWN MUSIC

We have still to speak of Beethoven. Recall Haydn for a moment. When Haydn was dying in Vienna, in 1809, the French were bombarding the town. Haydn's servants were terrified, but Haydn took it all very calmly. He asked to be lifted from his bed to the piano, and when he had got seated he played his own "Austrian Hymn" three times over, while the guns were thundering outside.

Now, at that very moment there was another composer in Vienna, crouching in a cellar, with cotton-wool stuffed in his ears. That composer was the mighty Beethoven. His hearing had begun to go, and he was frightened that the sound of the explosions would still further endanger it. Think of a musician being *deaf!* You might as well think of a painter being blind! Yet Beethoven, in some respects the greatest composer who ever lived, became almost totally deaf. The infliction embittered all his later years, and turned an originally lovable man into a kind of surly bear. Beethoven, like Handel, did not marry. He would throw the soup in his housekeeper's eyes when it did not please him, and stamp and rage and growl over the most trivial annoyances. Let us be charitable to him when we read of these things. It must have been awful not to be able to hear his own compositions.

THE HOME OF A BOY WHO WAS TO MAKE A NOISE IN THE WORLD

But Beethoven, apart from his deafness, had a very hard life. Born in 1770, at Bonn, that pretty little university town on the Rhine, where they have preserved his birthplace just as it was, he had to work his way up in a home directed by a father who was a confirmed sot. The father was musical, and he had heard something about the triumphs of the Mozart children in Vienna and Paris and London, and he thought he would make money out of his own Louis. So he set him to work at

the piano, and visitors would often see the child late at night shedding tears over the keyboard. By-and-by he was sent to Vienna to complete his musical education. There he met Mozart, who exclaimed, when he heard him play: "Pay attention to this youngster, for he will yet make a noise in the world." We know now how true that prophecy was.

THE DEATH OF BEETHOVEN IN VIENNA AND THE BIRTH OF CHOPIN IN POLAND

Beethoven's works for the piano—particularly his sonatas—are the grandest things of their kind ever written. All the great pianists regard him as the king of composers for their instrument. And so, too, with the orchestra. Take away Beethoven's nine symphonies—the "immortal nine," they are sometimes called—and we should take away the *backbone* from the orchestra. He did not write very much for the voice, for he was essentially an instrumental composer; but he left one beautiful song, "Adelaide," and one great opera, "Fidelio." He passed away in March, 1827, and Vienna never before saw such a funeral as his, the crowds being so immense that the soldiers had to be called out to clear a passage for the procession.

There was another great composer for the piano, and he wrote the most poetical, dreamy, emotional things that we are ever likely to hear from that instrument. The name of this composer was Frederic Chopin. He was a Pole, born near Warsaw, in 1809, and his music seems to breathe the romance that we commonly associate with his nation. He was a consumptive, and died early, in 1849, after a long struggle with disease and weakness. There was something feminine about him, but perhaps that is just why we find his music so refined, and so full of emotion and grace. He is really the poet of the piano—nothing strong and grand about him, like Beethoven—with an ethereal grace and charm such as we find in no one else.

MENDELSSOHN, A GENIUS WHO WAS BORN TO WEALTH AND HAPPINESS

Another great composer who met him in 1834 gave him the significant pet name of "Chopinetto." This was Mendelssohn, a German, born the same year as Chopin himself, by the way, who said of one of his pieces, "it is so perfectly beautiful that I could go on for ever playing it." One might say the same of several of Mendelssohn's own compositions. He was born to wealth and happy worldly circumstance, and never had to struggle with poverty or other ills. So his music is bright and genial, clever and pure, manly and refined. His "Songs Without Words" are among the classics of the piano; and his oratorio "The Elijah" ranks in popularity next to "The Messiah." It was written specially for the Birmingham Musical Festival—for Mendelssohn had a great affection for the English people, and liked London better than Berlin or Leipzig. He had a short life, but his early death, in 1849, seems to have been hastened by grief at the loss of a favourite sister.

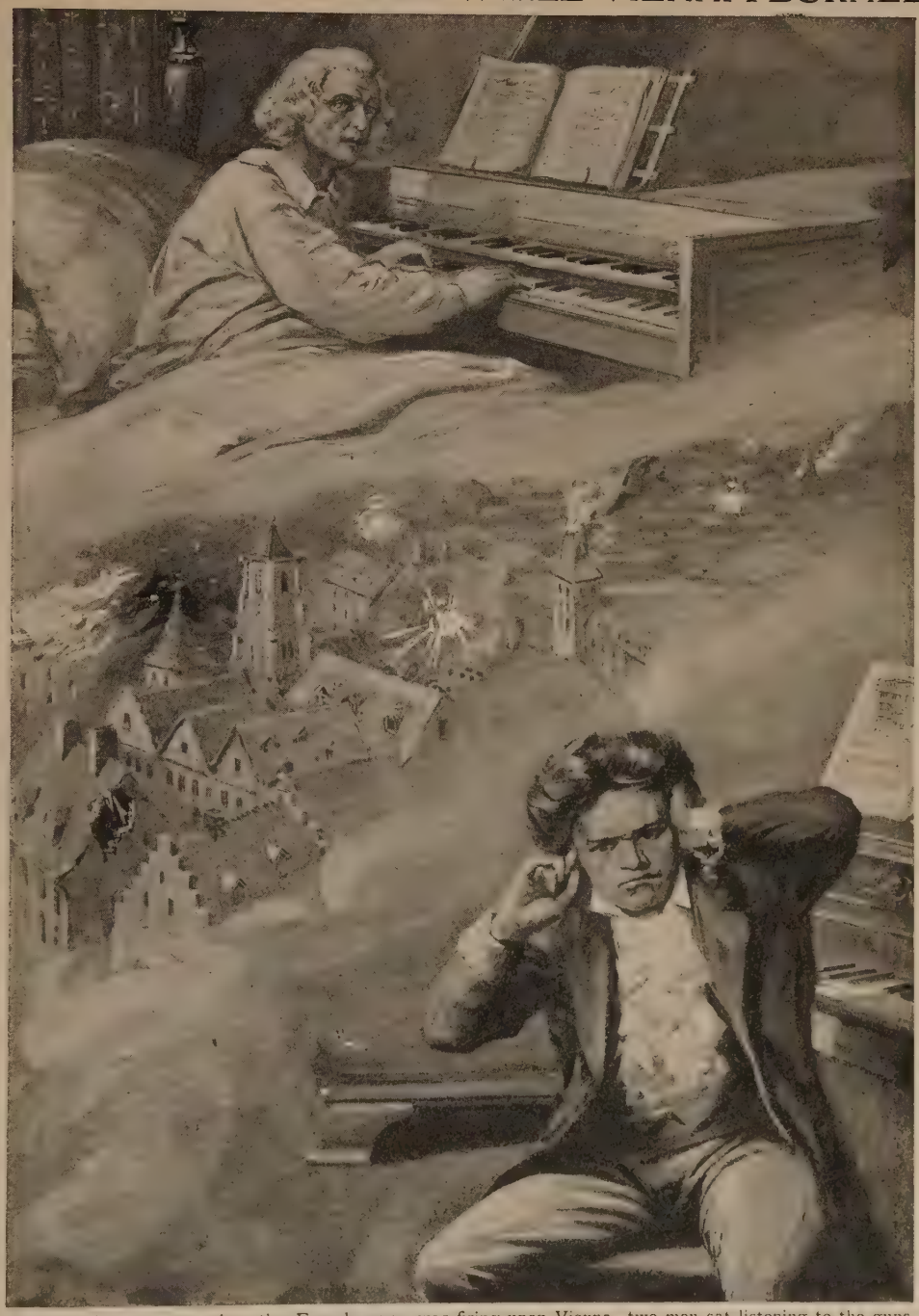
A composer of a very different type was Robert Schumann, born at Zwickau, in Saxony, in 1810. There was no reason for his being unhappy, for his father was a publisher in easy circumstances. But there was a taint of insanity in the family. Schumann's sister died at twenty of an incurable melancholy; and Schumann himself spent his last years in an asylum, after trying to drown himself in the Rhine, near Bonn, where Beethoven was born.

SCHUMANN, WHO WROTE THE CHILDREN'S ALBUM, & WAGNER, WHO WROTE OPERAS

We can thus understand that his music is of a rather sombre cast. But we must remember, too, that he was the composer of that "Children's Album" of pieces which every little player of the piano gets acquainted with. Schumann wanted to be a great pianist, and to that end contrived a tiny machine of his own for exercising the third finger, which, we know, is not so supple as the other fingers. The machine hurt his hand, and he had to give up his ambition. But here again we have profited, for if Robert Schumann had been a great player, it is not likely that he would have been a great composer.

Now, there is just one more very great name to be mentioned, and that is the name of Richard Wagner. Musical people have been making a lot of Wagner in recent years, perhaps in return for the neglect he suffered during his life. He is not a composer in whom young folks can take a very deep interest, because he wrote little

HOW HAYDN PLAYED WHILE VIENNA BURNED



A hundred years ago, when the French army was firing upon Vienna, two men sat listening to the guns that thundered through the streets. In a cellar sat Beethoven, vainly trying to shut out the sound of the guns from his ears, lest they should ruin his hearing and make him deaf to music; in another room Hadyn struggled up in his bed, and with his dying fingers played the Austrian national anthem to try to drown the noise of the enemy's fire. It is a wonderful picture that this tale brings to our minds—the picture of two of the world's great musicians, whose music will live for ever, sitting, while life and power were ebbing from them—for Beethoven *did* become deaf, and Haydn died—helpless in the face of the great destroyer of mankind, the cruel curse of war.

but those great musical dramas upon which he prided himself so much, "Lohengrin," "Tannhäuser," "The Meistersingers," "The Flying Dutchman," "Tristan and Isolde," and the rest. He had an idea of his own about opera, and it was this—that the words are of equal importance with the music.

THE GREAT STORIES THAT WAGNER SET TO MUSIC

The older opera composers thought the music was everything, and the words of *their* operas were often silly to the verge of nonsense. Wagner changed all that, and if we read the words of his operas, we may enjoy the mere story perhaps almost as well as the music. He liked to deal with old German myths and legends, and we find his tales of Lohengrin and Tristan and Tannhäuser exceedingly interesting. He, too, was a German. He was born at Leipzig, in 1813, and had a very troubled career until the crazy King Ludwig of Bavaria, who was not crazy about music, took him up and gave him money and a home, which saved him to the world. He died in 1883, and he is buried at Bayreuth, where his final home was, and where he had created a specially constructed theatre for the performance of his works. There his widow, who was a daughter of Liszt, still lives.

Now we may turn to an Englishman, Sir Arthur Sullivan—born in 1842, died in 1900—who, when he was studying at Leipzig, was believed by his teachers to be destined to become England's greatest composer. We cannot call Sullivan a really great composer; but, at least, he must have our thanks for all the pleasure he has given by his delightful comic operas. He fell short of true greatness in his grand opera and his oratorio work, but we never think of that when we are listening to the tuneful melodies, the bright, sparkling choruses, and the charming instrumentation of that long string of familiar works which he wrote.

SIR ARTHUR SULLIVAN'S FAMOUS OPERAS, AND OTHER COMPOSERS

In these delightful works, from "The Sorcerer" and "H.M.S. Pinafore," on to "The Gondoliers" and "Utopia, Ltd.," he successfully established something altogether new in British musical art. His comic opera music "wears well," as we might say, and there is no reason why all these operas should not be as popular fifty years hence as they are to-day. Many people know Sullivan *only* by these operas. But he was a very versatile composer, and he wrote some fine hymn tunes which can never die. One of them we all know—the tune "St. Gertrude," sung to "Onward, Christian soldiers." And who does not know such songs of his as "Sweethearts" and "The Lost Chord"? For the first-named song he received $3,500 from the publisher, and the second brought him a handsome yearly income from the time of its publication onwards. Out of his comic operas he made more money than any other composer ever made out of music.

There are so many more composers to write about, when one begins to go over the names. There is Gounod, for example, the Frenchman who gave us the always popular opera of "Faust." There is Rossini, the Italian who gave us "William Tell" and the world-famous "Barber of Seville," and other operas that our fathers and mothers knew very much better than we do.

GREAT COMPOSERS WHO WERE NOT FOR ONE AGE BUT FOR ALL TIME

Verdi, too, we ought to remember for his "Il Trovatore" and "Aïda," and much later works of a more masterly kind. And Weber, also, for his "Der Freischütz," and Meyerbeer for his "Les Huguenots," and Donizetti for his "Lucia," and Bellini for his "La Sonnambula," and Balfe for his ever fresh and ever welcome "Bohemian Girl."

We ought to speak of Liszt, the greatest of all the great pianist-*composers*; and of Tschaikowsky, the Russian master, whose "Pathetic" symphony is now as familiar as anything of Beethoven's; and of Brahms, though his music requires much study and pondering, and is not very suitable for young people; and of Strauss, and then of Sir Edward Elgar, and of a great many more. Think of Bizet and his "Carmen," of Mascagni and his "Cavalleria Rusticana," of Leoncavallo and his "Pagliacci." And there are a host of others. The others, however, we are not very sure of just yet; but of these, the really great, we may safely say, in the words of Shakespeare, that they are "not for an age, but for all time."

The next Men and Women begin on 3327.

LITTLE AGNES OF THE SNOW

CONTINUED FROM 3168

Up among the mountains in the Lake District of England, shown in this picture, there used to be a cottage where a man named Green dwelt with his wife and children. Agnes, the eldest, was nine years old when one day in winter her father and mother went to an auction in the neighbourhood. The weather was fine when they started, and they kissed the children and told Agnes to look after the five younger ones, saying they expected to be back during the evening.

But, as gloaming came on, a thick mist settled down over everything, snow began to fall, and the children peered out into the gathering darkness and longed for their parents' safe return. Agnes was a brave little girl, and she did her best to take care of her brothers and sisters, gave them their supper, put the baby twins to bed, and talked to the others to prevent their crying for their mother.

By this time the snow was falling thick and fast, and soon it covered the path, and white lines showed under the door and through the crevices of the windows. Still there was no father or mother. At twelve o'clock Agnes heard her two brothers and little sister say their prayers, and then all crept into bed.

Next morning the cottage was nearly snowed up, and still there was no sign of father or mother. Little Agnes busied herself dressing the children and getting their breakfast. She opened the door and gazed on the mountains covered with snow. Could she get through that snow? Suppose her father and mother were lying in it just a little way down the path there. Should she try to find them? She shouted, but there was no reply, and she dared not leave the little ones.

The third day dawned, and it was snowing harder than ever, hissing as it came down the chimney and nearly putting out the fire. Still the children were alone, shut away from father and mother and the whole world, while the brave Agnes looked after them as well as she knew how, and encouraged them to say their prayers as their mother had taught them.

By next morning the snow had ceased falling, and little Agnes made up her mind to go forth to find out about her parents and to get provisions for the little family. She could not cross the beck, but went a long way round to Grasmere. She told her story, a search-party was formed, and her father and mother were found dead in the snow. Everyone who heard the sad story and knew of the bravery of Agnes was anxious to help the orphan children, and we are glad to know that they were well looked after.

THE BRAVE DIVER OF TORBAY

ONE summer day a torpedo-boat, practising in Torbay, Devonshire, came to grief, for her propeller shaft snapped and pierced her plating, so that the water rushed into her.

Some other boats came to her aid, but she sank in about half an hour. The crew, fearing the boiler would explode, had taken to the boats, and there, 150 feet down, the boat remained until it was decided to send divers to examine her.

Two men, Sidney Leverett and Walter Trapnell, came forward, and one light summer evening they were taken out, with all their diving apparatus, to where the wrecked boat lay.

Trapnell was let down first, and he soon sent up a telephone message that he had found the wreck. He was told to note the damage and to signal when he could be drawn up.

But no signal came, and the full twenty minutes, beyond which time it is dangerous for a diver to stay down at such a depth, had passed. What could have happened? The men in the boat pulled the life-line, but all they felt was a heavy weight.

Of the men in the boat, Sidney Leverett most keenly recognised that something serious was the matter with his mate. He sent down a message to ask what was wrong. Then, to his horror, he heard that Trapnell's lines were fouled, and he was unable to get clear. That meant that his friend was caught like a fly in a spider's web, and could not get away from the wreck.

Without a moment's delay, he slipped over the edge of the boat, and dropped down to the wreck. There he found his friend standing on the bottom, his life-line and precious air-tube entangled in the wreck. He worked hard trying to free him.

Every instant's delay added danger, for Trapnell had used up all the air available to him, and if he could not be freed soon, Leverett knew he would become unconscious and die. Every moment he himself was getting weaker and weaker, yet his friend's life depended on his quickness and skill. Once he felt it was hopeless to try any longer, but then he thought, "No, I cannot leave my mate. He must be saved. I won't leave him." So he struggled on patiently.

At last he set Trapnell free. Leverett signalled and sank into unconsciousness, while the men in the boat drew up the two divers very slowly, or the rush of fresh, pure air would kill them both. When they were at last freed from their diver's dresses, Leverett slowly recovered, but his poor friend, for whom he had risked so much, was so weak that he died the next day.

Yet the bravery, skill, and loyalty of Leverett had saved him from an awful death in darkness and loneliness at the bottom of the sea.

A GALLANT DEED OF A BOY KING

EVEN as a girl, Queen Elizabeth showed that independence of character which made her reign so remarkable. She and her little stepbrother, Edward, four years younger than herself, played together as children, and when they grew older, and were separated, the lonely boy missed the bright companionship of his sister, whom he called his "sweet sister Temperance." He was only a little boy of ten when he became king, and after that he rarely saw Elizabeth, and had to content himself with writing affectionate letters to her.

When he was only twelve years old he saved Elizabeth's life. One day, when the Thames was running high, the princess insisted on mounting her brother's horse, an animal only partly broken in. The horse dashed through the gateway, off in the direction of the river, and leaped over the palace wall into the water. Startled by the commotion, the boy king ran out to discover what was wrong, and when he heard what had happened to Elizabeth, he at once sprang into the saddle of another horse and followed her over the wall into the river. Good horseman as he was, he needed all his powers to reach his sister. She tried to spring on to his horse, but failed and sank. He dived after her, and, getting hold of his own horse, coaxed it to swim with them while he supported her, and at last the three got safely to the bank.

The photograph of Grasmere on page 3253 is by Mr. G. P. Abraham, Keswick.

THE NEXT GOLDEN DEEDS ARE ON PAGE 3471

The fire-fly, which is really a beetle, flies by night, and lights up the tropical forests where it lives with a million tiny, moving lamps. Travellers tie the fire-flies to their boots to lighten their path.

SOME INSECT FRIENDS OF MAN

CONTINUED FROM 3147

"WHAT'S the good of insects? You cannot plant them, and you cannot eat them." So said a member of the American Parliament not long ago, when it was proposed that money should be spent on protecting certain forms of insect life. Doubtless many British farmers would say the same thing if a similar course were suggested to them. Many of them do not take the trouble to distinguish between harmful insects and those which are their friends.

There was once a stupid fellow who saw a toad, one of the best friends of the gardener.

"Toad, are ye? I'll learn ye to be a toad," he said, and brought down his spade, whack! on the poor toad's head. That is just the sort of thing that the ignorant people would do with all sorts of insects. We have been studying some of the insects which are harmful to man, so we must be fair and look at the case of those which are our friends.

We will take in more than insects, too, for we will say a word for the humble worm, which is not an insect, as, of course, we know. Most people hate worms, and kill them when they can. Yet worms are industrious helpers of the farmer and gardener. Darwin studied their habits closely, and found that they help greatly in making our soil good and fertile. They eat the earth in which they live, just as the wood-borers eat the substance in which they make *their* homes.

The worms bring to the surface the earth which they have eaten. They make channels in the soil by which the air can enter and give the soil the nitrogen which it needs for making it fruitful. They carry down pieces of grass and straw, and these help the process. But most important is their work in bringing to the surface soil which has been lying below. Darwin found by calculation that the worms on a single acre of land bring up ten tons of dry earth to the surface every year.

Some savage peoples are really far wiser observers of Nature than we are. They realise the value of earthworms. When a native of the Yoruba country, in Africa, decides to cultivate new soil for a farm, for what sign does he look? He looks for the evidences of earthworms. Probably he has never taken the trouble to reckon up how much work the earth-worm actually does. He cannot go into figures as Darwin did. But he does know that the earth-worm makes the soil good for crops. So if he sees that worms are at work upon a tract of land, it is there that he sets to work to farm. If the land lacks worms, he knows that it is of no use his attempting

to farm, and he goes farther afield until he does find them. Probably few people who love the evidences of past civilisation think that they owe anything to worms. But they owe a very great deal. Those beautiful tessellated pavements which the Romans made in Britain have been preserved for us almost entirely by worms. They covered them with soil, in which they have been secure for a thousand years. But for the worms these precious relics of the past must long ago have been destroyed.

The most charming of all the things which bear the name of worm is a creature which is not a worm at all—the glow-worm. The glow-worms, as we call them, are really beetles, and do us good service by entering the shells of snails and devouring the occupants. Naturally, they move about at night, or they would not need the wonderful light which they are able to produce.

THE MARVEL OF THE GLOW-WORM AND ITS WONDERFUL LAMP

The light is phosphorescent, and is produced from fatty cells, to which run many tubes carrying the oxygen necessary for the light. The operation of this light is as wonderful as the operation of the batteries of the electric fishes. The rays of light which the glow-worm gives off are said to possess the same properties as the famous X-rays—they will pass through solid substances through which the eye cannot see. Men can produce light by gas and electricity, of course; but they cannot do as the glow-worm does—produce light without heat. This humble beetle has a power which man cannot imitate.

All the energy that it uses goes to making light, none is wasted in heat. The male glow-worm has wings, and flies about on summer nights, showing his light frequently, but for short intervals. The female has no wings, but shows her light to attract her lover. He is delighted when he finds her; but she is very heartless, and when he arrives she continues to flash forth her light to attract other males, so that she may have a number of them buzzing about her to sadden the heart of the first arrival, her real sweetheart.

The powers of the light given forth by the glow-worm are very great considering how small the beetle is. Placed in the dark, the glow-worm yields a light strong enough to enable us to read print by it, or to tell the time by a watch. There are hundreds of species of this beetle and other light-giving beetles.

THE FIRE-FLY THAT IS REALLY A BEETLE AND LIGHTS UP THE FOREST

The fire-flies, like the glow-worms, are really beetles. We have few of these in some parts of our country, and our dark nights do not show the glories of the nights of some countries. In Ceylon, in South America, in the West Indies, and in some parts of Canada, among other places, the forests at night are like dream lands or fairy worlds. The fire-flies wing their way in countless swarms around the trees, lighting up the foliage as with gleaming diamonds. After rain the air seems filled with trains of flashing stars, waving about the tree-tops in glowing circles, making the scene such as might inspire the mind of poet or painter.

These wonderful creatures have their real use, as well as beauty, for the traveller. Men who would not dare to pass, unlighted, through the forests at night attach the fire-flies to their boots to light the path they tread. Thus lighted, a man goes on his way as in daylight, and when the sun gets up, he gratefully replaces his living lanterns on a shrub so that they may live to serve others in the same way.

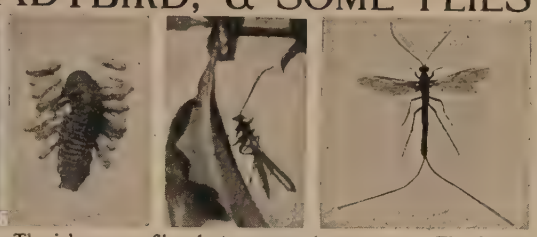
Certain birds use the fire-flies to light their nests. Natives make lanterns of them. Spanish ladies wrap them in gauze, and use them as ornaments for their hair; and young people decorate their dresses and the harness of their horses with them.

A LITTLE FLY THAT FIGHTS FOR MAN AND SAVES OUR GARDENS

We must leave these beauties, however, and pass to another noted family which is famous, not for its beauty, but for its service to man. This is the family of ichneumon flies, with whom we have already made acquaintance. There are thousands of species, and it is safe to say that men engaged in agriculture would be helpless without them. They lay their eggs in the bodies, or even in the eggs, of harmful insects, and so destroy these while multiplying themselves. How this is done we have seen in our story of the caterpillars. That is one way. The female has what is called

THE WORM, THE LADYBIRD, & SOME FLIES

Although the common earth-worm is sometimes a nuisance, it is really one of the greatest friends of man, draining and ventilating the soil, and turning it over and over. The great scientist, Darwin, wrote a whole book about worms.



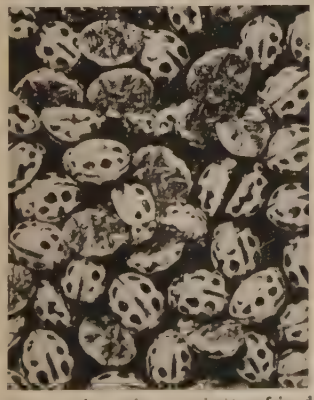
The ichneumon flies destroy many insect pests. The female lays her eggs in the larvæ of other insects, and these hatch and feed upon the living victim. On the left we see a caterpillar from which twenty ichneumons have emerged. Next is the ophion ichneumon, and last of all the long-tailed ichneumon.

On the left is a dragon-fly grub feeding upon an insect, and on the right a fly emerging from its grub-skin.

Born in water, the dragon-flies live in air, and they get their name from their fierce preying on small insects.

This dragon-fly is at rest. Dragon-flies are sometimes called "horse-stingers," but they do not sting horses.

On the left we see a dragon-fly's empty chrysalis case. The other three pictures are the bot-flies of the horse, the ox, and the sheep. They are the real gad-flies, although the harmless dragon-fly is often called by that name. Bot-flies are terribly destructive to our domestic animals, to whom they cause very great suffering.



The gardener has no better friend than the ladybird, for its larva destroys the mischievous green-flies. Here we see some ladybirds that were wintering under a haystack.

Like the ladybird, the glow-worm is really a beetle, and it does good service by devouring snails. Here we see the glow-worm and the beetle of which it is really the larva. The female shows a much brighter light than the male, and this light, which is in the tail, will illuminate an inch or more round the creature. Country people call glow-worms "stars of the earth."

The photographs on these pages are by F. P. Smith, W. P. Dando, B. Hanley, P. Collins, S. Johnson, D. English, W. S. Berridge, J. Ward, J. Lyle, and others.

an ovipositor. This is a sort of combined spear and tube. With the spear she makes an opening in the body of the insect in which she is going to deposit her egg, then, having made it, she produces an egg from the tube, and leaves it in the victim's body. Sometimes an ichneumon will lay its eggs in the body of another ichneumon, but generally they choose other insects, and chiefly keep each to its own class of victims. Let us watch one at work on a rose leaf.

THE BATTLE FOR LIFE BETWEEN AN INSECT PEST AND AN INSECT FRIEND

Although the aphides make very good cows for the ants, they are terrible enemies of our rose-trees, whose leaves they spoil by robbing them of their life-juice. Down comes an ichneumon fly. She walks on her high, stilt-like legs, over the leaf until she sees a plump aphis. She touches it with her antennæ.

If the aphis were thus touched by an ant it would quickly produce some honey, but now it knows that a deadly enemy is at hand. It begins to wriggle violently to escape the doom which instinct tells it is near. The fly may wait until the aphis has finished wriggling, or may even give up and go to another victim. But in the end she is successful. One thrust of her lance in the back of the green-fly's neck makes the nest of the egg. In that wound the egg is placed, and the ichneumon, having fifty or sixty such eggs to place, hurries on elsewhere to continue her task.

The aphis does not die. It knows what has happened, and, leaving its companions, crawls away to a leaf to be all by itself. Presently the egg hatches, and the grub which leaves the cell lives upon the flesh of the aphis. We can only hope that the latter feels no pain. It seems a dreadful story, but naturalists suppose that the aphis suffers a sort of paralysis, which mercifully prevents it from feeling discomfort.

THE TINY FLY THAT KILLS THE FOES OF THE COTTON PLANT

When the grub has reached a certain size, the aphis dies. Then the grub makes its way out of the dead body and spins a silken cocoon for itself in which it undergoes changes, and finally comes forth as a winged ichneumon fly. In that stage it lives upon the juices of certain flowers, and in its turn goes out to find aphides in which to deposit its own eggs. But for the ichneumons, men would be helpless against the attacks of caterpillars, green-fly, and other things of the same sort. The blessing is that they make their attacks upon insects which are among the most numerous in the world, and from which we suffer most injury.

There is a very important ally of the ichneumon fly of our gardens called the chalcid fly, a fly of many species. Probably the people of Lancashire do not think much about it, but their prosperity as the greatest cotton manufacturers in the world depends very largely upon these tiny flies. The cotton plant has terrible insect enemies, and the chalcid flies are the only things to keep them down. The chalcid is no match for the fully developed insect, but scientists have found that it destroys millions of the eggs of these larger insects, and so saves the cotton plant from being ruined by the grubs which would issue from the eggs if the latter were left undisturbed.

A FLY THAT HAS CROSSED THE OCEAN TO MAKE POOR FRUIT RICH

Another thing that one of the chalcid flies does is to give figs to California which now rival those of Smyrna. Smyrna figs have been from early times the best figs in the world. Farmers in California bought trees from Smyrna, and made them grow in California, but the fruit was not the same. Clever men of science studied the problem and solved the mystery. They found that the Smyrna fig-tree is the home of a chalcid fly which, with its saw-like weapons, cuts into the fig-bud, and so introduces pollen which makes it big and sweet and rich. Chalcid flies were therefore placed upon the trees in California, and the figs grown there under these conditions are said to be as good as those of Smyrna. Here, then, are two examples of the great value to men of some of the smallest of Nature's offspring.

The ladybird is another of our friends in this country. People have such a horror of anything called a beetle that it is just as well that the ignorant do not know that the ladybird *is* a beetle, or, in spite of its great work for us, it would be killed by the stupid. We like to pet the ladybird because it is so pretty and so fearless. But its real value to us lies in the fact that it eats

INSECTS THAT DO GOOD IN OUR GARDENS

The lace-wing fly lays each of its two or three hundred eggs on the end of a tiny hair. The larva feeds upon plant lice.

One of the most curious of insects is the praying mantis, so called because the front legs are held up as in prayer. It is not found in the North, but in the Southern States; is useful in killing harmful insects.

The May-fly, related to the termite, spends two years in the water as a chrysalis, and dies the day it flies.

Here we see the whole life-history of the caddis-fly. On the left are the fully developed creatures, flying and at rest. Below is the grub, and the other figures are grubs emerging from the curious cases that they make for themselves. There are many kinds of caddis-flies in America, and they make their cases of different materials, some of twigs and leaves, others of grains of sand and stone, and one of the shells of water snails.

The ant-lion is a most interesting creature. While in the larva stage it makes a pitfall in which to catch its prey. It hides at the bottom, with only the tips of its jaws appearing, and here it waits until an ant or other creature rolls down, when the ant-lion seizes it in a moment, and devours it. In the left-hand picture we see the ant-lion larva in its pit about to seize a victim, and on the right is the perfect ant-lion, looking like a beautiful dragon-fly.

the insects which destroy our plants. One species lives entirely on the aphis, the rose-pest; other species live on those tiny animals which we call scale insects—the things that ruin hops and fruit-trees. The young lady-birds might be in danger of being killed if people did not see them devouring the plant-lice. They are so unlike their parents. They look like tiny crocodiles when they first begin to run about the leaves on which they have come from the egg. Soon, however, it is seen that they are hunting aphides, and then their mission is realised to be one of value. The full-grown ladybirds have to seek warm retreats in the winter, and it is then that many get into our houses. They can be safely handled and examined. If they are roughly treated or alarmed they have the power to emit a yellowish fluid with an unpleasant smell.

How insects were brought from New Zealand to save our hops

So valuable are the ladybirds that they are sent from country to country. A cargo was sent to California to destroy the scale insects which were killing the orange-trees there. These were so successful that a cargo was brought from New Zealand to England to cope with the scale insects which were multiplying on our hop plants.

Unfortunately this was not such a success. The climate did not suit the little visitors so well as that of their native land. They found the hop plants too high for them, and refused to seek higher than three feet from the ground. Finding the work so unsuitable for them, they gradually forsook the hops and worked away at the scale insects in the currant-bushes in the nursery gardens.

The beautiful dragon-fly is another of the creatures which are commonly misunderstood. It has a spear-like tail, and when threatened curls this up and down as if it meant to sting. This might frighten a larger enemy; it certainly frightens ignorant human beings, who call it the "horse-stinger" and kill it, when they can, in the belief that it is an enemy. They kill a very good ally by so doing. The dragon-fly, though it does not and cannot sting, is a sort of king of our insect world. It lives on other flying insects, and when we see it dashing about in the air like a flash of light, it is simply hunting prey which, if left, would injure us. Its powers of flight are marvellous, and it is impossible for a man even with a big, long-handled net to catch them when they are flying.

The gorgeous dragon-flies that travel as fast as trains

They seem to know exactly what he means to do, and no matter how swiftly he may move, no matter how cunning he may be, they always manage to keep just out of reach of his net. They must be caught when at rest, if at all. It is the swiftness of their darting, swallow-like flight which makes them so certain of catching mosquitoes and other insects on the wing. They can catch insects when flying at the rate of forty or fifty miles an hour.

To enable them to make their rapid pounces in all directions, they need fine eyesight. And they have almost, if not quite, the finest eyes in the insect world. Their nearest rivals in this matter are the butterflies and day-moths. Not only are their eyes big; they are compound, made up of an enormous number of facets, each of which is an eye to itself. The dragon-fly has practically from 15,000 to 20,000 eyes in each of its eyes, and through each tiny angle can see as clearly as we can see with *our* eyes.

It must not be thought that the dragon-fly is an exception in having these marvellous compound eyes. The point is that the eyes of the dragon-flies differ in degree of strength, not in kind, from the eyes of other insects. Insects nearly all have these compound eyes. Our common house-fly, for example, has thousands of cone-shaped eyes bound into one big cone-shaped eye, and each facet is a separate self-working eye, though part of the greater eye.

An insect with twenty-five thousand windows to its brain

The house-fly, as he darts across the kitchen or into the larder, has 8,000 chances of seeing food or the cream-jug. The common beetle has 6,000 chances of seeing something worth looking at, while the mordella beetle has over 25,000 windows to its brain.

We must not leave the dragon-fly without a word as to the manner in which he came into the world. His life-story is similar to that of the

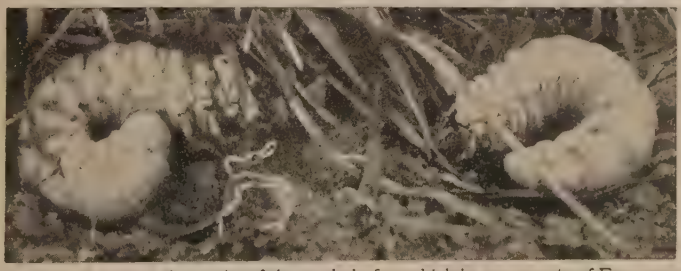
SOME BEETLES THAT ARE USEFUL TO MAN

The tiger beetle is the most perfect example of a beetle that exists, and no insect is more tiger-like in the way it preys on other small creatures.

Here we see the tiger beetle's formidable jaws open. It rarely misses the prey it pounces upon, and is a most useful friend in our gardens.

The rove beetle, or devil's coach-horse, is so called from its wandering habits. When meeting an enemy it raises its tail, as shown in this picture

There are many water beetles, some living on flesh and others on plants, but the only beetles that live entirely in the water are those of a family represented here by the great water beetle. On the left we see the larva, then the male beetle, and on the right the female with her egg cocoon fastened to a floating leaf.



On the left we see the grubs of the cockchafer, which in some parts of France are fried and eaten. The cockchafer is one of our worst foes, and were it not for the aid of such insect friends as the ground beetles, they would devastate whole districts. Another destructive insect is the summer-chafer, shown on the right. It is so much like the cockchafer, though somewhat smaller in size, that it is often mistaken for a young cockchafer.

The violet ground beetle, shown on the left, is a valuable friend of man, as it feeds largely upon cockchafer grubs. The cellar beetle of the middle picture is common in old houses, and is much blacker than the ordinary black beetle. On the right is the burying beetle, shown at work on page 3264, with its wings extended.

mosquito. The eggs are laid in fresh water, and hatch there. The larvæ eat very hungrily, strong nippers in front enabling them to grasp and eat quite big insects and other forms of food. Their breathing is very curious. In a way it is like that of a fish. They have no windpipe or lungs, of course. The water enters the lower part of the body, where many little tubes extract from it the oxygen necessary to the insect's life. Then the water is forced out again, and the pressure of the water going forth is sufficient to drive the larva on its way without its troubling to swim by other means. When the time for a change comes, the larva crawls wearily up the stalk of a plant. He is feeling far from well. There he rests for a while. Suddenly the dull old coat in which he has been floating about splits down the back, and lo! a gorgeous dragon-fly creeps forth. He has wings now, small and damp and crumpled ; he would be helpless if an enemy sought him. But he waits, and the sun dries him, and his wings harden and expand, and very soon he rises into the air in all the majesty of four splendid wings, and with a coat of mail bright and shining as the mail that the knights wore in days of old.

THE BEAUTIFUL DRAGON-FLY AND THE HARMFUL GAD-FLY

Sometimes we hear the dragon-fly called the gad-fly. There could not be a greater mistake. The gad-fly is another name for the bot-fly, one of the greatest enemies we have. The horse-bot lays her eggs on the hair of the horse, in some place where the horse will be sure to lick itself. The eggs cling to the tongue of the animal and are swallowed. They remain in the stomach of the horse all the winter, and, leaving the body of the horse in the spring, burrow into the ground, and there become flies.

The ox-bot is more generally known as the warble-fly. This horrible creature serves the cattle as the ichneumon fly serves the aphis and caterpillar, boring a hole in the hide and laying its egg there. Cattle are terribly afraid of the warble-fly, and will sometimes gallop themselves to death to escape it.

The sheep-bot is the worst of all, for this crawls into the nostrils of the sheep and lays its eggs there, where the grubs, on hatching, sometimes crawl into the brain of the poor sheep and kill it. These are the gad-flies, so we must never again confuse our gay friend, the dragon-fly, with them.

The dragon-fly and the mosquitoes are not by any means the only insects which undergo such surprising changes, being born in water, to fly in the air. The same course of life is followed by very many others with which we can afford to be on the very best of terms.

THE SNUG LITTLE HOUSE THAT THE CADDIS-WORM BUILDS

The caddis-fly, for example, deserves a chapter to itself, could we spare the space. The eggs hatch in the water in which they are laid, and the grubs are called caddis-worms, which fishermen are only too glad to secure for bait. They make the most wonderful nests for themselves in which to pass their days under water.

They gather bits of sticks and leaves, grains of sand, and tiny fragments of shell, and cement them all together to make the snuggest of houses. Some cut leaves and twigs into short lengths, and cement them together to form a tube. Others build up a home made of shells, in which the little animals to which they belong are already living, and the living molluscs are fastened round to make a live belt or shield for the caddis-worm.

Inside these tubes the caddis-worm spins a robe of silk which leaves its tail covered, but permits its head and legs to come out, so that the larva may collect its food of vegetable or animal substance. When they are to undergo their change, they close up this front door, either with plates of silk or with stones, so that the water may come through, but not animal enemies. Before the great change quite arrives, the larva must come out again, quit its cell for ever, and climb up on to a plant, where its shell will split open and it will appear as a pretty winged insect, the caddis-fly proper.

THE MAY-FLY THAT LIVES THREE YEARS IN WATER AND ONE DAY IN AIR

All this discussion of insect changes must have made us think of the life of the May-fly, or day-fly, as it is also called. The story of its life in the water is similar to that of the other insects of which we have been reading. But here the life in the water may last for two or three years. In that time the larva lives a busy life, hunting and feeding on

other insects, making itself dwellings in the sand or mud, and slowly, very slowly, preparing for the time to come. Finally, the great day arrives ; the pupa stage has been passed, and the insect climbs out of the water all ready for flight, except that it is still wrapped in its pupal robe. This has to be worked off, and then the May-fly mounts into the air. The flies may be seen in millions and millions on a summer evening, dancing and eddying in the warm air over canal or pond or stream. Their lives in the air never last more than a day. Often only an hour passes between the time of their leaving the water and their death. In that short time the females lay hundreds of eggs on the leaf of some water plant. Then they die. Their life in the air has begun and ended in, perhaps, an hour, after they have spent years in the water preparing for it; and at the end of that hour their dead bodies lie in such multitudes that they may be swept up and strewn on the fields for manure.

THE CUNNING ANT-LION THAT DIGS A PIT FOR ITS PREY

It is to this order of insects that one of the most extraordinary—the ant-lion—belongs. After it has undergone its change, the ant-lion becomes a pretty fly, but it is while in the larva stage that it most interests us. It makes a pitfall in which to catch its prey, and this is the way in which it does it : selecting a dry, sandy spot, it first marks out a circular furrow ; then it places itself in the centre, and, half burying itself in the sand, it begins to dig. It uses one of its legs as a shovel ; with this it throws up the sand on to its head, with which it jerks the material out of the circle and beyond the furrow. In the cleverest way it thus makes a tunnel down into the ground, funnel-shaped, two or three inches wide at the top, and narrowing down to the bottom.

When the work is finished, the ant-lion practically buries itself in the sand at the bottom of the pit, and waits, listening, for an insect to come along. Presently, down topples an ant or something else ; the ant-lion springs from its hiding-place, and, seizing the victim with its strong jaws, holds it until it has sucked all the juices from its body, then it throws the body out of the pit and waits for more. Should the prisoner be skilful enough to escape from the ant-lion and start to crawl up the side of the pit, the ant-lion at once flings up sand or earth with its head, and so causes the runaway to fall down again. These adventures suggest the doings of the trap-door spider, but we shall come to that in the next story.

THE PRAYING INSECT THAT HELPS MAN BY KILLING INSECT PESTS

We turn now to another famous insect, the praying insect, or praying mantis, as it is called. These do not live in the Northern States, but so many pictures have been published that we are all familiar with their appearance. Though they can fly, they do not pursue their food on the wing. They wait on trees or shrubs until an insect draws near. The head is bent down and inwards, the long, powerful front legs are folded and held up as if the creature were praying. But the instant a fly or other insect draws near, the big front legs shoot out and seize it, and down the throat of the mantis it goes. We must regard it as a friend of man, for it kills and eats a great number of injurious insects. There is one species of mantis in India which is most wonderfully coloured, so that when it rests it looks like some gay orchid. Insects approach it believing it to be a pretty flower, and are at once seized and gobbled up.

Going to the opposite extreme we come upon the up-curving body of a very fierce-looking beetle. We point a stick or a finger at him, and he opens his strong jaws and curls up the back part of his body, and looks ready to fight. And so he is. He is the big rove beetle, which we call the devil's coach-horse. For all his black, ugly body, his threatening looks, and the nasty fluid which he emits when attacked, he is a prime favourite with all gardeners who study natural history.

HOW THE DEVIL'S COACH-HORSE SLAYS A CATERPILLAR

His appetite is as big as his courage. The devil's coach-horse will attack any insect, no matter how big. With a snap of its great jaws it will cut caterpillars or earwigs in half, and make a meal of them. Snails and slugs are among its dainties, and it will eat any carrion which it may find. The devil' coach-horse belongs to a big family of

rove beetles. One of the family is to be found among the pets in the ants' nests of which we have read. They keep it because it gives them honey.

We have read so much about eggs deposited in the bodies of live creatures that we may turn now to beetles which choose dead bodies for the purpose. These are the famous burying beetles. They are to be seen in England, and it was the study of those here which led to the discovery of many interesting forms abroad. We never see them unless there happens to be a mole or mouse or some other small animal lying dead in the garden. Then they come up as if from nowhere, husband and wife, busy as can be, and claim the body as if they had bought and paid for it. Folding up their wings, they at once begin to dig.

These curious sacred beetles are rolling a ball of refuse to their hole. When they have got it there they feed on it ravenously, hardly stopping to rest. They are called scarabs, and were worshipped by the ancient Egyptians.

If the soil on the spot is not of the right sort for their work, they drag the dead animal to some place more suitable. To do this requires extraordinary strength in beetles, but they have very powerful jaws. The digging begins with a circular furrow like that made by the ant-lion, and then another is made within that. They keep digging away until the body begins to sink. When it has sunk far enough they throw over it the earth which they have excavated. Then they feast upon the body, and the female lays her eggs in it, so that when the larvæ hatch they shall find food ready to hand. Then off they go again.

Here we see a pair of burying beetles busy at work on a dead dormouse. They will dig round the body until it sinks into the ground and then they will eat part of it, and the female will lay her eggs in the remains of the carcase.

Of course, these are not the only beetles to bury things. The sacred beetle of Egypt does it, too. This beetle, whose proper name is the scarabæus, belongs to a numerous family. It collects refuse, makes it into a ball, and rolls it into its hole in the ground. There it feeds untiringly, for a fortnight at a time, without resting, until the mass is gone. In other balls of refuse it deposits its egg, and from this, in due course, the young scarab issues. The Egyptians used to think that the old scarab died on entering the ground, and that the young scarab was the same beetle resurrected. Many other silly traditions of this sort came to be associated with this beetle, and it was as sacred to the Egyptians as the ibis. They worshipped it while it was alive, and after its death embalmed it, just as they embalmed their own monarchs. And yet it is only a scavengering beetle of very unpleasant tastes.

Returning to our garden again we must say a word for another beetle or two. Nearly every one that we find there is a friend, living upon injurious grubs and insects. The tiger beetle and the violet ground beetle deserve special mention as among helps of the gardener. The tiger beetle has about a thousand species, but the majority of them are in the hot lands. Ours are pretty and active, and possess great jaws and powerful wings. They live entirely on insects. The list of friendly insects is far from complete. There are, indeed, thousands and thousands of different sorts of insects that are harmful to us, and there are probably just as many that help us. We can all extend our knowledge by personally watching the daily lives of the insects around us in our gardens and elsewhere.

The next story of Nature is on page 3295.

THE NOVELS OF THACKERAY

MOST of the famous novels written by W. M. Thackeray, whose life is told on page 2311, introduce us to characters whom we seldom grow to like so well as we do those of his great contemporary Charles Dickens. Of course, there are exceptions to these among his stories, for he was a gentle-hearted, lovable man himself, and could scarcely have failed to give us some lovable characters. The first of his novels chosen for reading here is, in many respects, his best; perhaps it is not too much to say that "The History of Henry Esmond" is the finest historical novel ever written. It is the most charming of all his works, Henry Esmond and Lady Castlewood being two of the noblest characters he ever created. The story was first published in 1852, and a sequel to it appeared six years later, entitled "The Virginians," the story of which we shall read after that of "Henry Esmond."

HENRY ESMOND

A ROMANCE OF THE DAYS OF QUEEN ANNE

CONTINUED FROM 3053

IN the latter days of William III. and during the reign of Queen Anne, when there were many people in England darkly scheming to restore the crown of this country to the son of James II., the events of this story are supposed to have taken place. Concerning the birth of Henry Esmond, it is necessary to know something at the outset, as much of importance later depends upon that. There was a certain Thomas Esmond, who had been to the Low Countries in the train of the Duke of York during the wars, and there he had married a weaver's daughter. They had one son, named Henry. Thomas Esmond, soon deserting his wife, returned to England, and the unhappy woman entered a convent, where eventually she died.

Succeeding to the title and estates of his uncle the Viscount Castlewood, Thomas Esmond married his cousin Isabel and kept his earlier marriage a secret. Although he was in many respects a rascal, the new viscount was not without some touches of good-nature, and on hearing of his first wife's death he had his little son Henry brought over to his fine ancestral home of Castlewood and placed in the care of his chaplain, Father Holt.

This was done, however, without his acknowledging the fact that little Henry was his rightful heir, or even admitting that he was his son. Indeed, the little fellow, as he grew up and gradually began to understand what others thought of him, gathered that he was supposed to be called Esmond by courtesy and not by right.

The Esmonds, though not all Roman Catholics, had, as a family, been loyal to the Stuart kings; and Father Holt, who was Henry's tutor, was a very active spirit in the Jacobite plots to restore James II. to his throne. Castlewood was, indeed, a centre of political intrigue. The Esmonds had made many honourable sacrifices in their devotion to the Stuarts; and, when James II. made his historic effort against William III. at the Battle of the Boyne, Thomas Esmond fell fighting for the defeated king. His widow Isabel, having been as strong a Jacobite as her husband, fled from the mansion of Castlewood and secluded herself in her house at Chelsea. Father Holt had also to take himself off, and little Henry was thus left alone with the servants at Castlewood, wondering what it all meant and feeling very lonely.

Soon, however, the new Viscount Castlewood, Colonel Frank Esmond, a bluff and hearty man of forty-five or fifty, came to take possession of the house and estates he had inherited from his deceased kinsman. With him came his wife, who was but twenty years of age, and their little daughter Beatrix, a lovely child of four, who kissed her cousin Henry the moment

they met, though she had never seen him before. There was also a baby-boy, carried in his nurse's arms. These were the four new friends with whom the life of Henry was now to be entwined.

When the young Lady Castlewood asked him his name he said, "My name is Henry Esmond," and looked up at her in a sort of delight and wonder, for she appeared to him the most charming object he had ever looked on.

HENRY SEES A VISION OF BEAUTY AND BEGINS A HAPPIER NEW LIFE

Her beautiful golden hair was shining in the gold of the sun; her complexion was of a dazzling bloom; her lips smiling, and her eyes beaming with a kindness that made Henry's heart to beat with surprise. Her beauty, both of body and mind, was to be a guiding star to him through life; and little he guessed how dear they would become to each other, for although a lady of twenty is quite an elderly person to a boy of twelve, a time soon comes when the eight years of difference count for nothing.

Lady Castlewood was a devoted wife, but her lord was not the best behaved of husbands. She served and tried to please him in every way, she watched over her children with loving care, and treated Henry with a gentleness he had never known before, so that a new and happy life was opening out for him, when, by a strange fate, he became the innocent cause of much unhappiness to her ladyship.

On a visit to the village he had somehow caught the infection of smallpox, and on this being discovered at Castlewood, my lord made it an excuse for betaking himself to town with Beatrix.

HOW HENRY WAS THE INNOCENT CAUSE OF LADY CASTLEWOOD'S UNHAPPINESS

Lady Castlewood and little Frank, who stayed at home, also caught the disease; and when her ladyship recovered she had lost that delicate beauty of her skin which had first charmed the eye of her husband. When the viscount returned he did not disguise his disappointment at the change which the disease had made in his wife, and she never forgave the look he then gave her.

In due course Henry was sent to Cambridge University to study for the priesthood, and when he returned for his first vacation he found as a guest at Castlewood and a boon companion of the viscount a certain Lord Mohun, whose evil reputation was known throughout the country. Lady Castlewood was now clearly unhappy in her husband's conduct, while he, whose drinking habits were evidently growing, complained to Henry of how she treated him, saying, "It's been that way ever since you brought the smallpox into the house."

Her ladyship naturally disapproved of her husband's friendship with the notorious Mohun; and when Henry returned from Cambridge a second time he found his lord and lady openly unfriendly with each other, and Mohun again a guest. Castlewood seemed to grow more reckless in his conduct, and one night before his wife he went so far as to say to Miss Beatrix: "When thou art old enough, Trix, thou shalt marry Mohun!" At this Beatrix laughed, and said Mohun had had a long talk with her mamma the night before.

"Ask Lord Mohun what I said to him, Frank," said Lady Castlewood, with great dignity, and taking her daughter by the hand, she swept out of the room.

A QUARREL BETWEEN TWO NOBLEMEN AND WHAT IT LED TO

"I will tell you what your wife said to me," said Mohun. "She asked me not to drink and gamble with you any more. You know best whether that was for your good or not."

"Oh, of course!" sneered Castlewood. "You are a model man, my lord."

"I am no saint, though your wife is," retorted Mohun. "And I can answer for my actions as others must for their words."

"When you please, my lord," said the viscount.

These words betokened the prospect of a duel, and Lady Castlewood was in great fear that such might be the case. But Mohun left the house next day, apparently on good terms with Castlewood. Soon an uneasy sense of trouble was felt by all at Castlewood, as the viscount grew moody and silent and had much business with his lawyer.

In about a month he declared that he was ill, and required to see his doctor in London. Henry was asked to accompany him; and at a tavern in the city his lordship met Mohun and others, and engaged in a game of cards, in the course of which Mohun and Castlewood

quarrelled. Henry could see at once that the whole thing had been arranged, and presently, as the party proceeded to Leicester Fields to fight a duel, Castlewood confessed to Henry that such was the truth. Mohun, he said, had written an insulting letter to Lady Castlewood, which he had intercepted, and he would have challenged him earlier only that he had first to pay off the betting debts he owed to him.

Almost before Henry had quite realised what was happening, the duel was over, his misled but good-hearted master mortally wounded. It was a momentous event for him, for just before the viscount died, he handed him a document which disclosed the truth about his birth, and proved him to be the real heir of Castlewood, the secret having been told to the viscount by the mysterious Father Holt.

What was Henry to do with this proof of his fortune? To claim the title and estates meant to dispossess young Frank, and to add to the already heavy sorrows of his beloved mistress. He threw the paper in the fire!

HENRY ESMOND MAKES A GREAT SACRIFICE AND IS ILL-REPAID

This great act of self-sacrifice seemed to be badly rewarded when Lady Castlewood visited him in prison, where he was lodged for a time for his part in the duel. She reproached him bitterly for not preventing her husband's death. Distracted with grief, she was unwittingly cruel in what she said to him, and she left his presence declaring she never wished to see him more.

On being released, Henry had now to give up all thoughts of becoming a priest. But as the Lady Isabel offered to help him, he did not hesitate to accept her help, knowing how much more was within his right. Thanks to her, he secured a commission in the army, and for more than a year he saw much active service, winning the rank of captain. On his return to England he was greatly disturbed to hear that Lady Castlewood was expected to marry the Rev. Tom Tusher, a characterless creature, who was chaplain at Castlewood. This he determined to prevent at all costs, ignoring the fact that her ladyship had asked him never to see her again. So he posted off to Winchester, where she was staying; and there, in the solemn old cathedral, still in her widow's dress, he found her at evensong, and by her side her son Frank, now grown into a handsome youth. As the service finished, Frank saw him first, and rushed to Captain Esmond with an eager welcome; while Lady Castlewood said:

"It was kind of you to come back to us, Henry. I thought you might come."

LADY CASTLEWOOD AND HENRY ESMOND BECOME GOOD FRIENDS AGAIN

She gave him her hand—her little fair hand. There was only her marriage-ring on it. The quarrel was all over. It was just as though they had never parted. And, best of all, there was not a word of truth in the story about my lady and Tom Tusher, which had been told to Esmond by the spiteful old gossip, Lady Isabel.

As they walked homeward in the gathering dusk of the winter's day, Lady Castlewood told Henry of her joy in having him back again. And he, in his new happiness, proposed that they should never part.

"Come away," he said. "Leave this Europe, which has so many sad recollections for you, and begin life again with me in the New World. There is that land in Virginia which King Charles gave our ancestor. Frank will give us that."

"Hush, boy," she replied. "For you the world is just beginning; for me, I must leave it and pray out my expiation, dear. But when your heart is wounded come to me, Henry."

When they reached the house, a new sensation was in store for Esmond.

HOW THE BEAUTY OF BEATRIX BEWITCHED HER COUSIN HARRY

Down the wide stairs of the old hall came the lovely figure of a bewitching young woman, carrying a candle in her hand, which lighted up the prettiest white neck in the world, and shone upon the scarlet ribbon she had donned on hearing that Captain Esmond was coming to dinner. This was Beatrix, whom he had left a girl and found a woman.

All the roses of spring could not vie with the brightness of her complexion. Esmond thought he had never seen anything like the sunny lustre of her eyes. She was a brown beauty—that is, her eyes, hair, and eyebrows and eyelashes were dark, her hair curling

with rich undulations and waving over her shoulders; but her complexion was as dazzling white as snow in sunshine. She approached, shining smiles upon Esmond, who could look at nothing but her eyes. She advanced, holding forward her head, as if she would have him kiss her as he used to do when she was a child.

WHY CAPTAIN ESMOND WENT OFF AGAIN TO THE WARS IN GERMANY

"Stop!" she said. "I am grown too big! Welcome, Cousin Harry!" And after making him a sweeping curtsey, she gave him both her hands and said: "Oh, Harry, we are so glad you are come!"

With many a tale of how the bewitching Trix had certain of the great noblemen of the day at her feet, Frank, in his boyish way, entertained Esmond during his stay. If Esmond did not as yet realise that Beatrix was, with all her gentler charms, not a little vain and somewhat fickle-hearted, he could see that whoever was to marry her would have to possess both rank and wealth. Yet deeply though he loved and admired Lady Castlewood, who was just as much older than he as Trix was younger, he was not without thoughts of asserting his claim to the Castlewood title and estates when he found himself bewitched by Beatrix; so to escape from his conflicting emotions, he went off again to the wars in Germany.

On his return to England he found himself possessed of the small fortune and the valuable diamonds of the Lady Isabel, who had died in his absence. Beatrix he considered more beautiful than ever. She was now engaged to marry the Duke of Hamilton.

THE AMBITIONS OF MISTRESS BEATRIX AND A JACOBITE PLOT

That eminent nobleman was about to proceed to France with the hope of inducing the son of James II., known as the Pretender, to come to England and make an effort to regain the throne, as Queen Anne was then in failing health. Beatrix was deeply involved in the plot, and was radiantly happy as she thought of her future greatness.

"Go and marry mamma," she said to Esmond, who had now attained the rank of colonel. "Go and be Darby and Joan for the rest of your lives! That's what you two are fitted for! Oh, cousin, when will you learn that I have no heart?"

At a modest house in Kensington, near by the palace, Esmond found his dear Lady Castlewood, and there learned from her that she, too, had come into possession of the secret of his birth, revealed to her by the Lady Isabel just before she died. It had been considered better for the cause of the exiled king that the secret should have been kept while Henry's father was alive. "But now the decision is with you, Harry," she said.

"My decision was made beside the death-bed of my dear lord," said Colonel Esmond. "I am the head of the family, but your son is Viscount Castlewood still."

"Dear, generous Harry!" cried the lady, throwing herself at his feet. "Nay, do not raise me. Let me kneel and—and worship you."

The generosity of Esmond—to which he was prompted more by love for Lady Castlewood than out of consideration for her son, though he had ever loved the manly Frank as a younger brother—made happy his dear lady.

BEATRIX SUFFERS A GREAT LOSS AND ESMOND ENGAGES IN A NEW PLOT

But the tragic death of the Duke of Hamilton, who had fallen, like the late viscount, in a duel with Mohun, though not before fatally wounding the rascal, was a sad blow for Beatrix. She bore herself with great dignity in the face of her ruined hopes, and proved thereby, perhaps, the truth of what she had said to Esmond about her lack of heart.

Colonel Esmond himself now put in action a plan for bringing the Pretender, James Stuart, over to England, so that on the death of Queen Anne he might quietly be proclaimed as king. The young Viscount Castlewood, who had been serving with the army on the Rhine, was still in that district. In personal appearance he closely resembled the Pretender; and nothing was easier than that the son of James II. should travel disguised as Viscount Castlewood, while Frank accompanied him as his servant. So was it planned and carried out, the Pretender being brought to the modest house in Kensington, where the Esmonds and all the Jacobite leaders in the secret did homage to him as their rightful king.

MISTRESS BEATRIX KNIGHTING HENRY ESMOND

Esmond had been of service to young Lord Castlewood abroad, and returning to England while his kinsman remained abroad, Esmond found the ladies of the family overjoyed to have him with them. A reception was prepared for him; and Beatrix, in the presence of her mother and Lady Isabel, knighted him as in the days of old.

This picture is reproduced from the painting by A. L. Egg, R.A., now hanging in the National Gallery of British Art.

All were now filled with the greatest hopes for the success of their conspiracy, and the only one among them who did not seem to be in earnest was the feminine and pleasure-loving James Stuart himself. He was more eager to make love to Beatrix than to engage with his supporters in advancing their scheme.

So Beatrix was practically banished to Castlewood, and felt very bitter towards Esmond in consequence, blaming him chiefly for what she considered the indignity put upon her.

At almost any moment, the conspirators were hoping, the great hour might arrive when a new King James would be proclaimed by them, as the announcement of the queen's death was made. One day, when the queen was thought to be sinking rapidly, they discovered, to their amazement, that the Pretender had d sappeared from the house in Kensington. At once they guessed that he had made his way to Castlewood, there to enjoy the company of the bewitching Trix.

Hastily getting to horse, Colonel Esmond and the young viscount spurred thither at breathless pace, and found they had guessed aright. Forcing themselves, no longer ceremoniously, into the presence of the young prince, Esmond upbraided him for his folly and the neglect of a great opportunity, saying that even now, it might be, the queen had died, and here was he writing foolish verses to a beautiful but light-headed girl. James Stuart treated the colonel at first with haughtiness, but Esmond was determined to brook no opposition in the course he had now decided upon; and he asked the Pretender to accompany him into the chaplain's room, where, from a little secret chamber over the mantelpiece, the colonel took some papers which had long been there concealed.

"Here, may it please your Majesty," said Colonel Esmond, "is the patent of marquis sent over by your Royal father at St. Germains to Viscount Castlewood, my father; here is the certificate

of my father's marriage to my mother, and of my birth and christening. I was christened of that religion of which your sainted sire gave all through life so shining an example. These are my titles, dear Frank"—turning to the astonished young viscount—"and this is what I do with them: here go baptism and marriage, and here the marquisate and the august sign-manual in which the late King James was pleased to honour our race."

COLONEL ESMOND BREAKS HIS SWORD BEFORE THE PRETENDER

So saying, Esmond set the papers burning in the brazier, and continued addressing the young prince.

"You will please, sir, to remember that our family hath ruined itself by fidelity to yours, that my grandfather spent his estate and gave his blood and his son to die in your service; that my dear lord's grandfather—for lord you are now, Frank, by right and title too—died for the same cause; and that my poor kinswoman, my father's second wife, sent all her wealth to the king, getting in return that precious title that lies in ashes and this inestimable yard of blue ribbon. I lay this at your feet and stamp upon it; I draw this sword and break it and deny you; and Frank will do the same, won't you, cousin?"

Frank, who had been looking on with a stupid air at the papers as they flamed in the old brazier, took out his sword and broke it, saying:

"I go with my cousin," giving Esmond his hand. "It's all your Majesty's own fault. The queen is dead most likely by this time, and you might have been king if you had not deserted your loyal friends in London."

HOW ANOTHER DUEL WAS INTERRUPTED BY MISTRESS BEATRIX

"Thus to lose a crown," said the young prince, starting up and speaking in his eager way, "and the loyalty of such hearts as these! I offer you the only reparation in my power. Will you favour me by crossing swords with me?"

James Stuart and Esmond had no sooner crossed swords than Frank stepped forward, and with the broken blade of his own knocked them up, just as Beatrix entered the room. A great change had come over her; her face had now assumed a look of deepest care, her cheeks were pale, her eyes glared.

"Will it please the king to breakfast before he goes?" was all she said; but, going up to Esmond, she hissed low a few words of bitterness in his ear. And, looking at her now, he wondered that he had ever thought of love for her.

When the king had reached London again, whither he was accompanied by Esmond and Castlewood, there was a great crowd outside Kensington Palace, and presently from the gates trumpeters and heralds came forth. The trumpets blew and the heralds proclaimed: "George, by the Grace of God, of Great Britain, France, and Ireland, King, Defender of the Faith." And the people shouted "God save the king!"

Thus King George's trumpeters blew all the hopes of the Pretender to the winds, and that unworthy prince was soon hurried back in secret to France.

After the failure of the Jacobite plot the young Viscount Castlewood went abroad, and there he married, somewhat foolishly, a German woman. When, soon after, Beatrix left her mother and her home to stay in France, Esmond one day found Lady Castlewood in tears, and besought that dear lady to confide herself to the care and devotion of one who would never forsake her.

COLONEL ESMOND AND LADY CASTLEWOOD BEGIN A NEW LIFE IN VIRGINIA

So it came about that this true hero and this gentlest of women joined hands as husband and wife; and Frank giving them the American property of the family in Virginia, thither they went and founded a new Castlewood.

"In our trans-Atlantic country," to quote the words of Esmond himself, "we have a season, the calmest and most delightful of the year, which we call the Indian summer; I often say the autumn of our life resembles that happy and serene weather, and am thankful for its rest and sweet sunshine. Heaven hath blessed us with a child, which each parent loves for her resemblance to the other. Our diamonds are turned into ploughs and axes for our plantations, and into negroes, the happiest and merriest, I think, in all this country; and the only jewel by which my wife sets any store, and from which she hath never parted, is that gold button she took from my arm on the day when she visited me in prison."

The next Famous Books are on page 3363.

A BALLAD BY A GREAT AMERICAN POET

JOHN GREENLEAF WHITTIER, one of the foremost poets of America, was born on December 17, 1807, and died September 7, 1892. He took a prominent part in the long fight for the liberation of the slaves in our land, and all his writings breathe a steady devotion to the cause of liberty and righteousness. One of his ballads has been chosen here as an example of his sweet and tender poetry. It is a simple story of what is happening every day, and there are many to whom the words "It might have been" have all the sad meaning they had for Maud Müller and the Judge.

MAUD MÜLLER: A TALE IN VERSE

CONTINUED FROM 3128

MAUD MÜLLER, on a summer's day,
Raked the meadow sweet with hay.

Beneath her torn hat glowed the wealth
Of simple beauty and rustic health.

Singing, she wrought, and her merry glee
The mock-bird echoed from his tree.

But when she glanced to the far-off town,
White from its hill-slope looking down,

The sweet song died, and a vague unrest
And a nameless longing filled her breast—

A wish, that she hardly dared to own,
For something better than she had known.

The Judge rode slowly down the lane,
Smoothing his horse's chestnut mane.

He drew his bridle in the shade
Of the apple-trees, to greet the maid,

And asked a draught from the spring that flowed
Through the meadows across the road.

She stooped where the cool spring bubbled up,
And filled for him her small tin cup,

And blushed as she gave it, looking down
On her feet so bare, and her tattered gown.

"Thanks!" said the Judge, "a sweeter draught
From a fairer hand was never quaffed."

He spoke of the grass, and flowers and trees,
Of the singing birds and the humming bees;

Then talked of the haying, and wondered whether
The cloud in the west would bring foul [weather.

And Maud forgot her briar-torn gown,
Her graceful ankles bare and brown,

And listened, while a pleased surprise
Looked from her long-lashed hazel eyes.

At last, like one who for delay
Seeks a vain excuse, he rode away.

Maud Müller looked and sighed, "Ah, me!
That I the Judge's bride might be!

"He would dress me up in silks so fine,
And praise and toast me at his wine.

"My father should wear a broadcloth coat,
My brother should sail a painted boat.

"I'd dress my mother so grand and gay,
And the baby should have a new toy each day.

"And I'd feed the hungry, and clothe the poor,
And all should bless me who left our door."

The Judge looked back as he climbed the hill,
And saw Maud Müller standing still.

"A form more fair, a face more sweet,
Ne'er hath it been my lot to meet.

"And her modest answer and graceful air
Show her wise and good as she is fair.

"Would she were mine, and I to-day,
Like her, a harvester of hay:

"No doubtful balance of rights and wrongs
And weary lawyers with endless tongues.

"But low of cattle and song of birds,
And health of quiet and loving words."

But he thought of his sisters, proud and cold,
And his mother, vain of her rank and gold.

So, closing his heart, the Judge rode on,
And Maud was left in the field alone.

But the lawyers smiled that afternoon,
When he hummed in court an old love tune;

And the young girl mused beside the well,
Till the rain on the unraked clover fell.

He wedded a wife of richest dower,
Who lived for fashion as he for power.

Yet oft in his marble hearth's bright glow
He watched a picture come and go.

And sweet Maud Müller's hazel eyes
Looked out in their innocent surprise.

Oft when the wine in his glass was red,
He longed for the wayside well instead;

And closed his eyes on his garnished rooms,
To dream of meadows and clover blooms.

And the proud man sighed with a secret pain
"Ah, that I were free again!

"Free as when I rode that day,
Where the barefoot maiden raked her hay."

She wedded a man unlearned and poor,
And many children played round her door.

But care and sorrow and child-birth pain
Left their traces on heart and brain,

And oft when the summer sun shone hot
On the new-mown hay in the meadow lot,

And she heard the little spring-brook fall
Over the roadside, through the wall,

In the shade of the apple-tree again
She saw a rider draw his rein;

And, gazing down with timid grace,
She felt his pleased eyes read her face.

Sometimes her narrow kitchen walls
Stretched away into stately halls,

The weary wheel to a spinet turned,
The tallow candle an astral burned,

And for him who sat by the chimney lug,
Dozing and grumbling o'er pipe and mug,

A manly form at her side she saw,
And joy was duty, and love was law;

Then she took up her burden of life again,
Saying only, "It might have been!"

Alas! for maiden, alas! for Judge,
For rich repiner and household drudge!

God pity them both, and pity us all,
Who vainly the dreams of youth recall,

For of all sad words of tongue or pen,
The saddest are these: "It might have been!"

Ah, well! for us some sweet hope lies
Deeply buried from human eyes;

And, in the hereafter, angels may
Roll the stone from its grave away!

A LAUGHING SONG

We have already had the pleasure of reading several of William Blake's Nature songs in our "Book of Poetry." Many of his short poems, such as that given here, might be described as songs of "the joy of the earth," borrowing a phrase from another poet. The idea of Nature being glad is, of course, as ancient as thought; and we find such phrases in the Bible as "Let the hills be joyful" and "The trees of the field shall clap their hands."

When the green woods laugh with the voice of joy,
And the dimpling stream runs laughing by;
When the air does laugh with our merry wit,
And the green hill laughs with the noise of it;

When the meadows laugh with lively green,
And the grasshopper laughs in the merry scene;
When Mary, and Susan, and Emily,
With their sweet round mouths sing, "Ha, ha, he!"

When the painted birds laugh in the shade,
Where our table with cherries and nuts is spread:
Come live, and be merry, and join with me
To sing the sweet chorus of "Ha, ha, he!"

POOR DOG TRAY

This has long been a favourite poem. Its simple pathos and just sentiment give it enduring life. It was written by Thomas Campbell, many of whose poems have appeared in these pages, and is properly entitled "The Harper," but it is more familiar under the title we have given it here.

On the green banks of Shannon, when Sheelah was nigh,
No blithe Irish lad was so happy as I;
No harp like my own could so cheerily play,
And wherever I went was my poor dog Tray.

When at last I was forced from my Sheelah to part,
She said (while the sorrow was big at her heart):
"Oh! remember your Sheelah when far, far away,
And be kind, my dear Pat, to our poor dog Tray."

Poor dog! he was faithful and kind to be sure,
And he constantly loved me although I was poor;
When the sour-looking folk sent me heartless away,
I had always a friend in my poor dog Tray.

When the road was so dark, and the night was so cold,
And Pat and his dog were grown weary and old,
How snugly we slept in my old coat of grey,
And he lick'd me for kindness—my old dog Tray.

Though my wallet was scant I remember'd his case,
Nor refused my last crust to his pitiful face;
But he died at my feet on a cold winter day,
And I play'd a sad lament for my poor dog Tray.

Where now shall I go, poor, forsaken, and blind?
Can I find one to guide me, so faithful and kind?
To my sweet native village, so far, far away,
I can never more return with my poor dog Tray.

THE PRIEST AND THE MULBERRY TREE

Thomas Love Peacock, born October 18, 1785, and died January 23, 1866, wrote a number of remarkable stories, full of wit and satire, and sprinkled with many charming poems. His novels are little read to-day, and only here and there do we find his poems quoted. The following is from his pen, and although the lesson it conveys is one that is very obvious, it is presented with a real touch of sly humour.

Did you hear of the curate who mounted his mare,
And merrily trotted along to the fair?
Of creature more tractable none ever heard:
In the height of her speed she would stop at a word;
But again with a word, when the curate said Hey!
She put forth her mettle and gallop'd away.

As near to the gates of the city he rode,
While the sun of September all brilliantly glow'd,
The good priest discover'd, with eyes of desire,
A mulberry-tree in a hedge of wild briar:
On boughs long and lofty, in many a green shoot,
Hung large, black, and glossy, the beautiful fruit.

The curate was hungry and thirsty to boot;
He shrunk from the thorns, though he long'd for the fruit;
With a word he arrested his courser's keen speed,
And he stood up erect on the back of his steed;
On the saddle he stood while the creature stood still,
And he gather'd the fruit till he took his good fill.

"Sure never," he thought, "was a creature so rare,
So docile, so true, as my excellent mare;
Lo, here now I stand," and he gazed all around,
"As safe and as steady as if on the ground;
Yet how had it been, if some traveller this way,
Had, dreaming no mischief, but chanced to cry Hey?"

He stood with his head in the mulberry-tree,
And he spoke out aloud in his fond reverie;
At the sound of the word the good mare made a push
And down went the priest in the wild-briar bush.
He remembered too late, on his thorny green bed,
Much may well may be thought cannot wisely be said.

THE BELLS. By Edgar Allan Poe

Edgar Allan Poe is one of the most remarkable poets America has produced, and, with the exception of Walt Whitman, the most individual genius in American poetry. He was born in Boston, Massachusetts, on January 19, 1809, and died in Baltimore, on October 17, 1849, after an unsettled and disastrous life. No modern poet or writer of fiction has excelled him in weird and "uncanny" imaginings. He is also a great master of word melody. In the following famous poem, which has long been popular as a recitation by reason of its dramatic force, one can see how the verse steadily increases in its measure of music and changes in character from the jingling of the light sledge-bells to the far-resounding noise of the great city bells ringing in the still night.

I.

HEAR the sledges with the bells—
Silver bells!
What a world of merriment their melody foretells!
How they tinkle, tinkle, tinkle,
In the icy air of night!
While the stars that oversprinkle
All the heavens seem to twinkle
With a crystalline delight;
Keeping time, time, time,
In a sort of Runic rhyme,
To the tintinnabulation that so musically swells
From the bells, bells, bells, bells
Bells, bells, bells—
From the jingling and the tinkling of the bells.

II.

Hear the mellow wedding bells,
Golden bells!
What a world of happiness their harmony foretells!
Through the balmy air of night
How they ring out their delight!—
From the molten golden notes,
And all in tune,
What a liquid ditty floats
To the turtle-dove that listens, while she gloats
On the moon!
Oh, from out the sounding cells,
What a gush of euphony voluminously wells!
How it swells,
How it dwells
On the Future; how it tells
Of the rapture that impels
To the swinging and the ringing
Of the bells, bells, bells,
Of the bells, bells, bells, bells,
Bells, bells, bells—
To the rhyming and the chiming of the bells!

III.

Hear the loud alarum bells—
Brazen bells!
What a tale of terror now, their turbulency tells;
In the startled air of night
How they scream out their affright!
Too much horrified to speak,
They can only shriek, shriek,
Out of tune,
In the clamorous appealing to the mercy of the fire,
In the mad expostulation with the deaf and frantic fire.
Leaping higher, higher, higher,
With a desperate desire,
And a resolute endeavour
Now—now to sit or never,
By the side of the pale-faced moon.
Oh, the bells, bells, bells!
What a tale their tenor tells
Of Despair!
How they clang and crash and roar!
What a horror they outpour
On the bosom of the palpitating air!
Yet the air it fully knows,
By the twanging,
And the clanging,
How the danger ebbs and flows;
Yet the air distinctly tells,
In the jangling,
And the wrangling,
How the danger sinks and swells,
By the sinking or the swelling in the anger of the bells—
Of the bells—
Of the bells, bells, bells, bells,
Bells, bells, bells—
In the clamour and the clangour of the bells!

IV.

Hear the tolling of the bells—
Iron bells!
What a world of solemn thought their melody compels!
In the silence of the night,
How we shiver with affright
At the melancholy menace of their tone;
For every sound that floats
From the rust within their throats
Is a groan.
And the people—ah, the people—
They that dwell up in the steeple,
All alone,
And who tolling, tolling, tolling,
In that muffled monotone,
Feel a glory in the rolling
On the human heart a stone—
They are neither man nor woman—
They are neither brute nor human,
They are Ghouls:
And their king it is who tolls;
And he rolls, rolls, rolls,
Rolls
A pæan from the bells!
And his merry bosom swells
With the pæan from the bells!
And he dances and he yells;
Keeping time, time, time,
In a sort of Runic rhyme,
To the throbbing of the bells—
Of the bells, bells, bells—
To the sobbing of the bells;
Keeping time, time, time,
As he knells, knells, knells,
In a happy Runic rhyme,
To the rolling of the bells—
Of the bells, bells, bells—
To the tolling of the bells,
Of the bells, bells, bells, bells—
Bells, bells, bells—
To the moaning and the groaning of the bells.

SAY NOT THE STRUGGLE NAUGHT AVAILETH

Arthur Hugh Clough is one of the most noteworthy among the lesser poets of England. Born at Liverpool on New Year's Day, 1819, he died at Florence, November 13, 1861. His poetry is not only beautiful in form but is weighted with thought, and these four short verses make up a little gem of poetic form and enlarging thought. They are a warning to us not to take a narrow view of life.

SAY not the struggle naught availeth,
The labour and the wounds are vain;
The enemy faints not, nor faileth,
And as things have been they remain.

If hopes were dupes, fears may be liars;
It may be, in yon smoke concealed,
Your comrades chase e'en now the fliers,
And, but for you, possess the field.

For while the tired waves, vainly breaking,
Seem here no painful inch to gain,
Far back, through creeks and inlets making,
Comes silent, flooding in, the main.

And not by eastern windows only,
When daylight comes, comes in the light;
In front the sun climbs slow, how slowly!
But westward, look, the land is bright!

THE INDUSTRY OF ANIMALS

We here give another of the poems of Thomas Miller, the poor basket-maker who became a poet and author of some note and whose writings are always of a pure and elevating character.

THE lute-voice birds rise with the light,
Their nestling young to feed,
Pursue the insects in their flight,
Or pluck the feathery seed.

The golden-belted humming-bee
Goes toiling hour by hour,
Over the moor and distant lea,
Wherever grows a flower.

With weary journeys up and down,
He home his honey brings,
From gardens in the distant town,
And while he labours sings.

The long-tailed field-mouse to the wood
Makes journeys many a score,
And in a granary piles his food,
And hoards his wintry store.

Within the hollow of a tree
The nimble squirrel hides
His meat and nuts right cunningly,
And for the cold provides.

His home the mole makes underground,
With runs and chambers crossed
And galleries circling round and round,
In which you would be lost.

Although the swallow in her nest
Displays such art and skill,
She has no tools save her white breast,
And small sharp-pointed bill.

There's not an insect crawls or flies
But what has work to do,
And the same God their wants supplies
Who watcheth over you.

No single thing did God create
But He for it gave food,
And whether it be small or great,
"He saw that it was good."

AULD LANG SYNE

There is probably no song in any language that has ever attained such a world-wide and enduring popularity as this famous song, partly, if not entirely, written by Robert Burns. Like most of his popular songs these words were composed for an old tune, though not for the tune to which it is usually sung, that being also an old Scots melody. It is the homely and human sentiment of the song that has won for it universal favour, even among people who are only dimly conscious of the real meaning of the old Scots words. There are many words in it that require explanation, but we need only say that it is a song in praise of friendship and "old time's sake" between friends who, we fear, are supposed to have a taste for drinking.

SHOULD auld acquaintance be forgot,
And never brought to mind?
Should auld acquaintance be forgot,
And auld lang syne?

For auld lang syne, my jo,
For auld lang syne,
We'll tak' a cup o' kindness yet,
For auld lang syne.

And surely ye'll be your pint-stoup,
And surely I'll be mine;
And we'll tak' a cup o' kindness yet,
For auld lang syne.

We twa hae run about the braes,
And pu'd the gowans fine;
But we've wander'd mony a weary fit
Sin' auld lang syne.

We twa hae paidled i' the burn
Frae morning sun till dine;
But seas between us braid hae roar'd
Sin' auld lang syne.

And there's a hand, my trusty fiere,
And gie's a hand o' thine;
And we'll tak' a right gude-willie waught,
For auld lang syne.

LITTLE WHITE LILY

Dr. George Macdonald contrives in these pretty little verses to state a simple fact from the life of the flowers in language that is at once child-like and yet perfectly expressive. It would be a good thing if some grown-up people who are fond of using needlessly long words, in the hope of appearing wise, would learn from this poem how much can be said in words that a child uses every day.

LITTLE white Lily
Sat by a stone,
Drooping and waiting
Till the sun shone.
Little white Lily
Sunshine has fed;
Little white Lily
Is lifting her head.

Little white Lily
Said: "It is good;
Little white Lily's
Clothing and food."
Little white Lily,
Drest like a bride!
Shining with whiteness,
And crown'd beside!

Little white Lily
Droopeth with pain,
Waiting and waiting
For the wet rain.
Little white Lily
Holdeth her cup;
Rain is fast falling
And filling it up.

Little white Lily
Said: "Good again,
When I am thirsty
To have nice rain;
Now I am stronger,
Now I am cool;
Heat cannot burn me,
My veins are so full."

Little white Lily
Smells very sweet:
On her head sunshine,
Rain at her feet.
"Thanks to the sunshine,
Thanks to the rain!"
Little white Lily
Is happy again!

LITTLE VERSES FOR VERY LITTLE PEOPLE

A LITTLE old man and I fell out;
How shall we bring this matter about?
Bring it about as well as you can;
Get you gone, you little old man.

THERE's a neat little clock,
In the schoolroom it stands,
And it points to the time
With its two little hands.
And may we, like the clock,
Keep a face clean and bright,
With hands ever ready
To do what is right

AS I was going up Pippen Hill,
Pippen Hill was dirty;
There I met a pretty miss,
And she dropped me a curtsey.

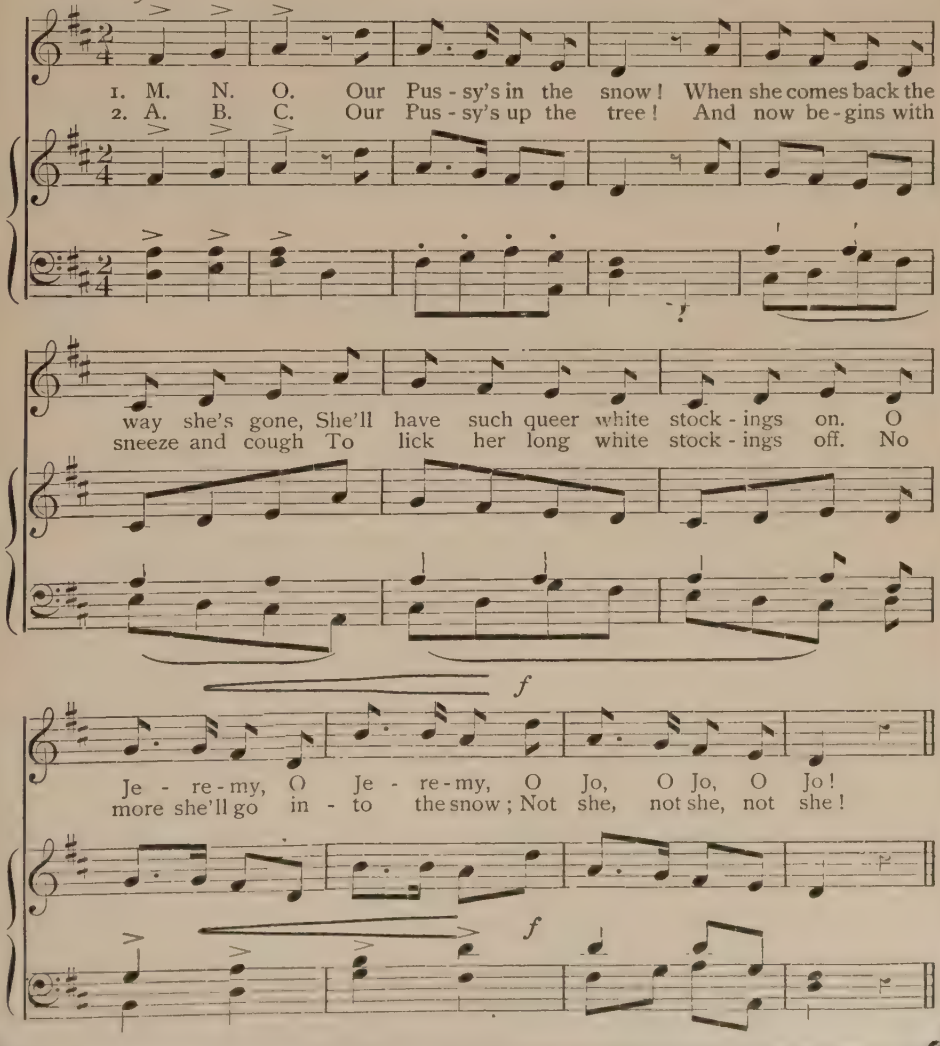
Little miss, pretty miss,
Blessings light upon you!
If I had half a crown a day,
I'd spend it all upon you.

THEY that wash on Friday, wash in need;
And they that wash on Saturday, oh!
they're sluts indeed.

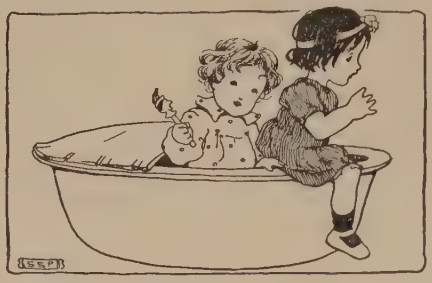
M. N. O.

Words by ALFRED P. GRAVES. Music by permission of MESSRS. SCHOTT & Co.

Naively.


1. M. N. O. Our Pus - sy's in the snow! When she comes back the
2. A. B. C. Our Pus - sy's up the tree! And now be - gins with
way she's gone, She'll have such queer white stock - ings on. O
sneeze and cough To lick her long white stock - ings off. No
f
Je - re - my, O Je - re - my, O Jo, O Jo, O Jo!
more she'll go in - to the snow; Not she, not she, not she!
f

BLESS you, bless you, bonnie bee!
Say, when will my wedding be?
If it be to-morrow day,
Take your wings and fly away.
Fly away east, or fly away west,
And show me where *he* lives who loves me the best!



BABY and I
Were baked in a pie,
The gravy was wonderful hot!
We had nothing to pay
To the baker that day,
And so we crept out of the pot.

"HOW many miles to Babylon?"
"Three score miles and ten."
"Can I get there by candle-light?"
"Yes, and back again;
If your heels are nimble and light
You may get there by candle-light."

BRIAN O'LIN had no breeches to wear,
So he bought him a sheepskin and made him a pair,
With the skinny side out, and the woolly side in,
"Ah, ha, that is warm!" said Brian O'Lin.

Brian O'Lin and his wife and wife's mother,
They all went over a bridge together;
The bridge was broken and they all fell in,
"Mischief take all!" quoth Brian O'Lin.

UP hill and down dale;
Butter is made in every vale;
And if that Nancy Cook
Is a very good girl,
She shall have a spouse,
And make butter anon,
Before her old grandmother
Grows a young man.

WASH me and comb me,
And lay me down softly,
And lay me on a bank to dry,
That I may look pretty,
When somebody comes by.

"OLD woman, old woman, shall we go a-shearing?"
"Speak a little louder, sir, I'm very thick of hearing."
"Old woman, old woman, shall I kiss you dearly?"
"Thank you, kind sir, I hear you very clearly."

"LITTLE maid, pretty maid, whither goest thou?"
"Down in the forest to milk my cow."
"Shall I go with thee?" "No, not now;
When I send for thee, then come thou."

SLEEP, baby, sleep,
Our cottage vale is deep;
The little lamb is on the green,
With woolly fleece so soft and clean--
Sleep, baby, sleep!

Sleep, baby, sleep,
Down where the woodbines creep;
Be always like the lamb so mild,
A kind, and sweet, and gentle child—
Sleep, baby, sleep!

DRIBBLE, dribble, trickle, trickle,
What a lot of rawdust!
My dolly's had an accident,
And has lost a lot of sawdust!

THE cuckoo's a bonny bird,
She sings as she flies;
She brings us good tidings,
And tells us no lies.
She sucks little birds' eggs,
To make her voice clear,
And never cries Cuckoo
Till spring-time of the year.

RHYMES AND JINGLES OF MARY MAPES DODGE

We have already had the pleasure of reading in the CHILD'S BOOK OF POETRY several of the pretty little poems specially written for young folk by the late Mary Mapes Dodge, a charming woman who used to edit the famous children's magazine called St. Nicholas. On this page and the next we have gathered together a collection of her little verses, which are rather nursery rhymes than poems. They have been reprinted, by permission of Messrs. Charles Scribner's Sons, from Miss Dodge's book entitled Rhymes and Jingles.

BILLY BOY

Poor Billy boy was music mad,
On music mad was he;
And yet he was as blithe a lad
As any lad could be.
With a "hi-de-diddle,
Bow and fiddle,
Rig-a-my, ho!" sang he—
For Billy was as blithe a lad
As any lad could be.

"Nobody knows the joys I know,
Or sees the sights I see;
So play me high, or play me low,
My fiddle's enough for me.
It takes me here, it takes me there—
So play me low or high—
It finds me, binds me anywhere,
And lifts me to the sky."
With a "hi-de-diddle,
Bow and fiddle,
Rig-a-my, ho!" sang he—
For Billy was as blithe a lad
As any lad could be.

THE GOOD LITTLE GIRLS

Oh, where are all the good little girls?
Where are they all to-day?
And where are all the good little boys?
Tell me, somebody, pray.

Safe in their father's and mother's hearts,
The girls are stowed away;
And where the girls are, look for the boys—
Or so I've heard folk say.

LITTLE WHITE FEATHERS

Little white feathers,
Filling the air—
Little white feathers,
How came ye there?
"We came from the cloud-birds
Sailing so high;
They're shaking their white wings
Up in the sky."

Little white feathers,
How swift you go!
Little white snowflakes,
I love you so!
"We are swift because
We have work to do;
But hold up your face,
And we'll kiss you true."

ONE AND ONE

Two little girls are better than one;
Two little boys can double the fun;
Two little birds can build a fine nest;
Two little arms can love mother best;
Two little ponies must go to a span;
Two little pockets has my little man;
Two little eyes to open and close,
Two little ears and one little nose,
Two little elbows, dimpled and sweet,
Two little shoes on two little feet,
Two little lips and one little chin,
Two little cheeks with a rose shut in,
Two little shoulders, chubby and strong,
Two little legs running all day long.
Two little prayers does my darling say,
Twice does he kneel by my side each day,
Two little folded hands, soft and brown,
Two little eyelids cast meekly down,
And two little angels guard him in bed,
One at the foot, and one at the head.

THE THREE OLD LADIES

There was an old lady all dressed in silk,
Who lived upon lemons and buttermilk;
And, thinking this world was a sour old place,
She carried its acid all over her face.

Another old lady, all dressed in patches,
Lived upon nothing but lucifer matches;
So the world, it made her strangle and cough,
And sure as you rubbed her you set her off.

Another old lady, all sunny and neat,
Who lived upon sugar, and everything sweet,
Exclaimed, when she heard of their troubles, "I never!
For the world is so nice I could live on for ever!"

Now, children, take your choice
Of the foods your heart shall eat;
There are sourish thoughts, and brimstone thoughts,
And thoughts all good and sweet.

And whatever the heart feeds on,
Dear children, trust to me,
Is precisely what this queer old world
Will seem to you to be.

From "Rhymes and Jingles," copyright, 1874, 1904, by Charles Scribner's Sons.

CONTINUED FROM PAGE 3176

A LITTLE VEGETABLE GARDEN

WHAT TO DO IN THE MIDDLE OF MAY

ONE of the important mid-May operations is weeding. Weeds grow apace at this season, and we have to remember that they are taking the goodness from the soil that our vegetable plants should receive. Our bed of onions must have special attention, and this we must certainly *hand* weed, as it will not be safe to use even a small hoe among our little plants. In fact, it will be a good rule to hand weed entirely among all our young and growing crops.

We may still sow lettuces, cress, and radishes to yield a supply when those already growing are finished. And let us always bear in mind that sowing should be done on ground that has been deeply dug, and then allowed a little while in which to settle; and we may even sow another row of peas if we have not sufficient already in the various stages of growth. It is very important to put sticks to our peas, and later on to our runner beans, directly they need support. They soon feel the need of something round which to grow. But we set up our pea-sticks, and still, perhaps, find that not quite every plant is able to reach them. In this case let us take some short twigs and branches, and place them close beside the little plants to help them until they find their way to the larger sticks. These are small matters, but they all help towards success.

In some places young gardeners will find themselves greatly troubled with slugs. These greedy insects may be dealt with by putting ridges of soot, or soot and lime, round the plants. Night is their feeding time, and many people find one of the most successful ways of catching them is to go out with a lantern about ten o'clock and pick them off their young plants and the soil, and destroy them. Another remedy is to cut slices of turnips or potatoes and place them on the soil. When they are lifted, numbers of slugs will probably be found on the under sides of them.

But after all our best friends in the matter of slugs and other insects are the toads; therefore, instead of killing them, we should do everything to encourage them.

If we sowed our string beans quite early they are perhaps at this moment our most forward crop. We should have thinned them, if necessary, before this, and must now keep a look-out for the tiny black aphis — an insect which infests the leaves; pick off these leaves and destroy them.

The squash and pumpkins are interesting to grow, different in character from most other things in our gardens. But it is a tender plant, and if we are waiting to sow the seed out of doors it had better not be done until the third week of the month, and then only if the weather is favourable. In many gardens these succeed better if raised above the level than if grown on the surface; we therefore make a mound with stable manure and leaves, and several inches of soil, and on this sow our seed. When the seedlings are through the soil, it will be a good thing to put empty pots over them for the night, as a slight protection for a little while. And we may give the same treatment to ridge cucumbers, if we choose to grow them.

For planting out our little cabbage plants, Brussels sprouts, and others as they become forward enough, it is well to choose showery weather, as this is helpful to growth. The time for this operation will depend upon the size of the plants. If it is a very dry time we may water the soil, and the next day plant them out, and then give them a watering in their new quarters. Young gardeners may be inclined to use the watering-can too freely. This is a mistake, for it means sour, saturated soil. We should water only when the surface is really dry. We may even scrape the soil away and examine it an inch or two below the surface, and if we find it moist we need not water that day.

Perhaps we have two or three gooseberry bushes in our little garden plots, and have decided that some of the fruit shall be picked unripe for tarts, leaving the rest to ripen. The unripe fruit should be picked from those trees which are in shady positions, as they will never become so sweet or so good as those in the full sunshine.

The present season is a good time to sow the seed for next year's wallflowers.

The best way is to sow in some little spare patch among the vegetables, and afterwards to transplant the little seedlings farther apart, and then in the autumn to put them in the positions in which they are to flower. It is very useful to use our vegetable garden in this way for seedling plants of flowering subjects that are not due to flower until next year, and if we like we may sow the seed now of forget-me-nots, sweet williams, canterbury bells, honesty, and of many other plants.

We must be careful to hunt for insects—grubs, caterpillars, and green-flies—on our rose leaves. Those rose-trees which we pruned so carefully at the end of March or early in April will by this time have grown a good deal. If we find a leaf curled round, or apparently fastened down one side over the other, and examine it, we shall find there a grub, which will in time become a young caterpillar, ready to eat the rose leaves and often destroy buds. There is nothing but hand picking to get rid of this pest. The little green-fly may also become troublesome, and here also we shall find that the fingers are as useful as anything to clear it away. We may water the rose-trees, and occasionally give them manure water, mixed with clear water and soot water.

Our annual plants need careful attention and should be trimmed as severely as the little vegetables. Poppies will not bear transplanting, but most of the others can be used in different positions if the roots are not injured as we lift them.

THE DANCE CALLED LAUDNUM BUNCHES

LAUDNUM BUNCHES is a corner dance, and many of the movements are typical of other dances. The dancers wave a handkerchief in each hand, holding it in one corner between the thumb and fingers, and wave it from the wrist with the arm upraised, as shown in picture 2. Some dancers secure it by twisting it round the finger. Laudnum Bunches seems a strange name for a dance. "Laudnum" is possibly a contraction of laudanum, a sweet-smelling gum, which used to be prepared from the leaves of a shrub and was utilised in making a perfumed powder. If this is so, the connection of a scented powder with handkerchiefs is accounted for.

The six dancers stand in two files and jump. Then the two files advance, so that the last couple are in the same spot as that where the first couple were before. Handkerchiefs are flung up while dancing at the fourth count of the step. The couples then retire and turn to dance facing the other way. The music is in six-eight time for these different movements, and just as the dancers get back to their original position they jump in half turning so as to face each other again.

With the change of music the movement called Corners starts. This reminds one of the familiar Sir Roger de Coverley dance.

The dancers stand facing each other, and Nos. 1 and 6 advance to pass each other and change corners, dancing the Morris step, and tossing up handkerchiefs, as shown in picture 2. Then turning about they face one another, and again approach as before, but only to the centre, and then retire to the

2. Tossing up handkerchiefs in the Corners figure

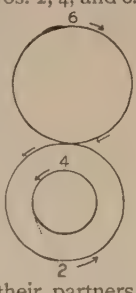
same corners, waving their handkerchiefs round their heads, and finally take a jump.

Next, Nos. 2 and 5 do exactly the same as the first couple. Then Nos. 3 and 4 do just the same as the other two couples. All the dancers are now in opposite places.

The music then alters to the original tune, and the dancers stand in file ready to start the Chain, which is practically a figure 8, and is a movement which is quite unlike the chain in the Lancers, where the dancers join hands,

3. The Back-to-Back movement in Laudnum Bunches

Nos. 1, 3, and 5 forming an S, and Nos. 2, 4, and 6 doing likewise. This is shown by a diagram of the movements of Nos. 2, 4, and 6.



The path of No. 4 is shown inside the path of No. 2 for the sake of clearness, but when No. 4 comes to the starting-place of No. 2 she begins following in the path of that dancer. Likewise No. 6 follows the path of No. 4 part of the way. At the middle of the chain the partners jump round to face each other again. The movements are reversed to finish the chain. Nos. 1, 3, and 5 dance the chain in the same way as their partners.

Next, the Corners are repeated. Following that is Crossing-over as in Bean Setting.

The next part of Laudnum Bunches shows the "high" step. Partners stand facing each other, and Nos. 1 and 6 start the Capers. They advance towards each other, handkerchiefs flung up as in Corners, jump in the centre, then pass on to each other's corners, hopping alternately on left and right feet, and keeping knees stiff and feet high. Then they turn round to face and advance half-way. The time changes, and they retire, waving the handkerchiefs round the head and dancing the same step as in Corners. Then they jump. The other couples do likewise.

The Back-to-Back movement is like that in Bean Setting. It is shown in picture 3, where the couples are dancing back to back round their partners. The repetition of Capers brings partners into their right corners again.

At the signal "All in," when the last couple is finishing, the dancers close in towards the centre, and as the music ends, toss up their handkerchiefs and make the "call."

THE DANCE CALLED BEAN SETTING

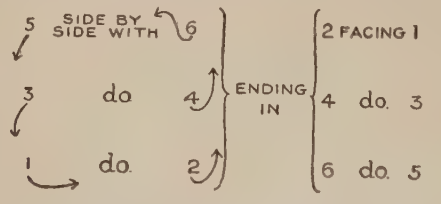
THE dance Bean Setting is so called because it illustrates the planting of beans in spring, and thus joyously celebrates the hopeful seed sowing. Six dancers stand in two-file form, each with a short stick in the right hand, held like a pencil, as shown in picture 1, and crossed with the partner's stick. The partners face each other. The sticks

1. Tapping sticks in the Ring figure in Bean Setting

replace the swords used in the ancient dance. The music of this dance starts with twelve-sixteen time, and the sticks are tapped on the ground or crossed in time with it. The dancers in their movements cover a space of about twelve feet each way.

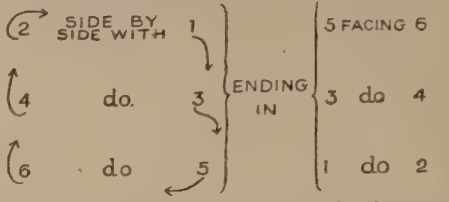
Dancer No. 1 is the leader, who calls out the figure or movement and makes known to his five comrades the end of the dance by the call "All in."

The first figure, named the Ring, starts by partners tapping sticks as shown in picture 1; then all the dancers form a ring, Nos. 3 and 4 moving a little out from their places, and then the whole six dancing in step to form half the ring. They then tap partners' sticks and circle the other way. In the picture which we see on the top of page 2765, they are shown dancing this Ring figure. The change which then takes place to jump into the position facing the music in two files is shown by the following diagram:



The arrows show how the ring is made, and the column on the right hand shows the new positions that are taken by the dancers.

In the second half the ring starts forming again, but when the dancers step out they do so in the reverse direction, as shown here:

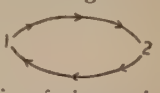


It must be noticed that when the dancers arrive in position facing each other, half-way through and also at the end, they make a half-turn jump into the file position again. and tap sticks across.

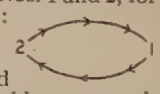
The next figure, Dibbing, imitates making holes for the setting or planting of beans. The music changes, and the partners face each other in two lines, holding the sticks in their right hands pointed down, and stooping forward. The stick is dibbed, or struck twice on the ground. The dancers stoop, and partners cross their sticks and tap them, letting the sticks remain crossed as seen in picture 1.

Dancers then tap their partners' sticks again, but instead of letting the sticks remain crossed, No. 1 taps No. 3, No. 3 taps No. 5, No. 5 taps No. 6. With the change of music No. 6 taps No. 4, No. 4 taps No 2, and this tapping all round ends by partners tapping and crossing sticks. Sometimes the Chain as described in Laudnum Bunches is danced here to lengthen the dance, which, though it seems lengthy, is very quickly performed.

The name of the next figure, Crossing-over, indicates the movement. Partners face, cross over and take each other's place, dancing the Morris step. For instance, Nos. 1 and 2 dance to opposite places, keeping each other on the right, and end by turning and facing each other, as shown in this diagram. Then all the couples dance in step round to the right in order that partners may get into the original position, facing each other again, and tap across. Nos. 1 and 2, for instance, then dance like this:



Dibbing is now repeated.



In the Back-to-Back movement partners advance and pass each other with right shoulders opposed, turn to the right half-way round each other back to back, and, with left shoulders opposed, retire into position backward. Nos. 1 and 2 move like this:

Tapping partners follows with the change of music. The movement of advancing and retiring is repeated, but partners dance forwards to the right of each other, opposing left shoulders in advancing, right on retiring.

Dibbing is repeated for the second time. Crossing-over is sometimes repeated here, and is followed by Dibbing again. At the call "All in," and as the music ends, the dancers form in two files with their sticks crossed.

HOW TO MAKE OUR OWN EASTER EGGS

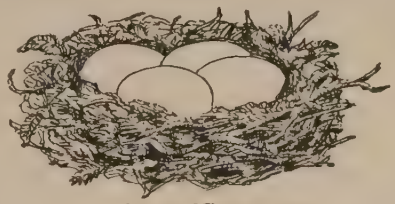
THE Easter egg is a beautiful idea. It is a symbol of the return of spring, for the egg contains in it, in a mysterious way, the promise of life. All over the world friends give and take presents of Easter eggs; in the country, perhaps, a basketful of the freshest new-laid eggs; but in town some of us may receive a pretty nest, or fancy basket, of sweatmeat eggs. Let us see if we can make some Easter eggs ourselves.

We might weave a little basket, or doll's hamper, as described on page 2131. In that we might put strips of torn white or pink tissue-paper. The eggs to go in the little hamper are real ones, well washed, and then, to make them firm, boiled for about ten minutes in a saucepan of water, coloured in some way. A few drops of cochineal will turn the water red and colour the eggs. Spinach water will turn them green; water in which onions or gorse-flowers were boiled, yellow. We can get mauve by boiling violet-blossoms; blue by using washing-blue. The water and eggs are taken out of the saucepan, and the eggs left in the water five minutes longer. The eggs, when coloured, are carefully dried and rubbed over with a cloth dipped in sweet oil, and placed on a dish to dry. We then pack them in the hamper, and direct it with a message on a card.

1. An owl egg

2. An old man egg

Picture 2 shows a funny surprise egg for the breakfast table. All we want for it is a pen and ink to draw the face and hair, and a little cap of red Turkey twill. A little egg-cosy embroidered with "Easter" makes a nice little present. Many are the faces and animals we can turn our eggs into by decorating the shell.



3. A nest of Easter eggs

Surprise chocolate eggs are a good idea. Boys who collect eggs and know how to "blow" them will find these easy to prepare. The empty shell is stood on its broad end, and two or three drops of melted chocolate are poured through the top hole. This must dry and harden to stop up the bottom hole. Then the egg is filled up with melted chocolate. To get this we take a bar of chocolate, put it in an empty jam-jar, and stand it in a pan of boiling water until the chocolate is melted, and can pass, by a funnel, through the hole in the egg. A little white sugar will cover up the dark spot, and great will be the surprise when the egg is cracked at table. The owl shown in picture 1 is a surprise egg of this kind, with little discs of crinkled paper for the eyes, a peak behind for the head, and two pieces for wings, all stuck on with a drop or two of gum. The feet are of bent wire, which is also bent into the form of a ring, in which the egg stands. That is easily done if we remember the barn-door cock made of bent wire as described on page 933.

We might make four surprise chocolate eggs and put them in a nest—not a real bird's nest, but one we can make ourselves. We first get some twigs and twist them together in the form of a nest—of course *ten* fingers can do what *two* small bills can do. A little glue will secure the twigs in place, and between them we arrange some real or artificial moss. Failing that, we can colour some green, or shred a little green crinkled paper. Pad the nest with little bits of cotton-wool and a downy feather or two, and then it is ready for the eggs, as shown in picture 3. A small basket, deep or shallow, is a good substitute for a nest.

A surprise egg might be filled with a sweetmeat of icing sugar, which is pure and wholesome. Take some icing sugar and dissolve it in a few drops of cold water, so that it will run through the small hole in the shell and fill the egg. Then place the egg in boiling water a few minutes to harden it. The icing can be made pink by adding to it a drop or two of cochineal.

A novel idea is to shape an egg out of dates coated with chocolate or icing sugar, or both. We take three large, perfect dates, and, having broken them open lengthways and taken out the stones, press the fruit together into as compact an egg-shape as possible. Their stickiness will keep the dates together. We then dip them in melted chocolate several times till they are well coated, and cover them with icing. Two table-spoons will help us to get the egg-shape.

The pretty eggs in the shops are not always fit to eat, but the delicious little eggs shown in picture 4 are made of marzipan and sponge-cake. We get a quarter of a pound of ground almonds, a quarter of a pound of white sifted sugar, and one crumbled and sifted stale penny sponge-cake. We put these into a basin, and mix them with one egg and a few drops of essence of almonds, using a fork first, and then the fingers, and tasting the mixture to see that the flavouring is right. We then take a lump and shape it into the form of an egg in the palm of the hand. No cooking is needed, but the marzipan is better for being kept a day. If we want the eggs quite white, we can coat them over with a little sugar icing, made by moistening some icing sugar with a little cold water—only a drop or two. The eggs must be set to dry and harden in a warm place. These little eggs might be put into a screw of brown paper tied round with narrow yellow ribbon.

4. Marzipan eggs

WHAT IS WRONG IN THESE PICTURES?

There is something wrong in each of these pictures. It will help us to cultivate our powers of observation to try to discover the mistakes the artist has purposely made. They are pointed out on page 3398

SAILOR'S HITCHES AND SPLICES

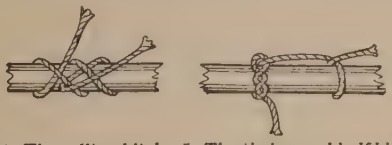
On page 235 we saw how sailors make knots. There are other ways in which sailors must make use of ropes—for instance, in making hitches, which are really a kind of knot, and in splicing ropes; that is, joining

1. The half hitch 2. The timber hitch 3. The clove hitch

two ropes together by uniting their ends without knots. In this article we see how to make hitches and how to splice ropes.

We show the simplest in picture 1. It is called a half hitch. We pass the end round a bar and its own standing part, and then down between its own part and the bar. The next, called the timber hitch, is made in the same way, except that the end is passed not once but several times round its own part, as seen in picture 2.

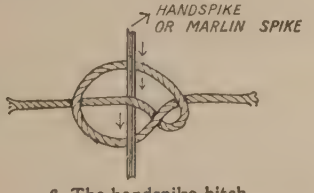
In making the clove hitch, shown in picture 3, we pass the end round the bar, cross it over the standing part, pass it round the bar again, and then pass it between its own part and the bar. The rolling hitch is made in the same way; but the second half of the operation consists in passing the rope twice round the bar, and in passing the end under both the turns, as in picture 4. The timber



4. The rolling hitch 5. The timber and half hitch

and half hitch is a combination of two hitches which we have already seen, and is made by making first a half hitch, and then making a timber hitch with the end part, as in picture 5.

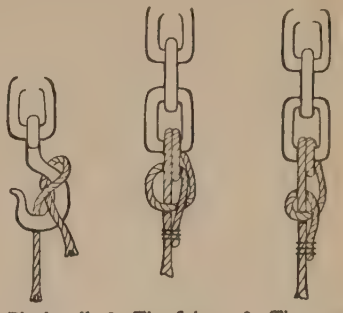
Now we come to what is called the handspike hitch. This hitch is frequently used by sailors when the two ends of the rope are fastened, and when they wish to exert pressure upon the rope. We make a loop in the rope first, and then pass the end of the bar through the loop, under the rope, in the loop, and then out through the loop again. It will then be as seen in picture 6. When we pull out the bar again, the rope is free, without any knot or hitch at all.



6. The handspike hitch

The Blackwall hitch, picture 7, which is used on board ship for suspending cargo from the hook of a crane, is made by passing the end of a rope round the back of the hook and under its own part, taking care that the two parts of the rope are on opposite sides of the hook.

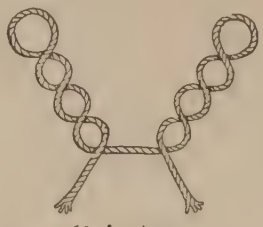
The fisherman's bend is used to fasten a rope to a shackle or ring. To make it, we pass the rope twice round the ring, and put the end through the turns. For security, the end must be tied to the standing part with strong string, an operation that is called "stopping back," as seen in picture 8. The round turn and half hitch is made in the same way, except that the end is passed through only one of the turns, as seen in picture 9.



7. A Blackwall hitch 8. The fisherman's bend 9. The round turn and half hitch

The series of loops seen in picture 10 is what is called a catspaw. We take a part of the middle of the rope, and form two bights, one of which we take in each hand and twist around an equal number of times, thereby making two loops, one at the end of each of the bights. A bar or spike may now be passed through the two loops.

We now come to the splicing of the ropes. This is more difficult than making knots or



10. A catspaw

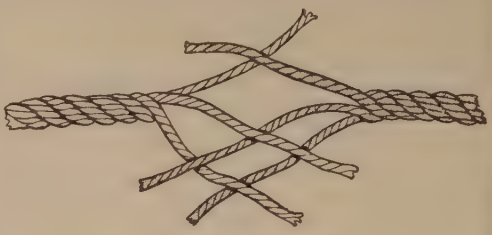
hitches, but it is a very valuable accomplishment, which, if once properly learned, should never be forgotten by us.

The eye splice is the method of making a permanent loop at the end of a rope. We take the end of the rope and unlay or open out the three strands for about 4 inches. Then we place these against the standing part at the spot which will give a loop of the desired size. We take the middle strand, and, after prizing up one of the strands of the standing part, pass the free strand beneath it. We then pass the other two strands, one on each side, under

the other strands of the standing part, and work the loop up tight, slightly tapering the strands by pulling off a little of the hemp. The usual practice is to cut one or more of the yarns composing the strands of the rope. After the first tuck has been completed with all strands, we pass them under the strands of the standing part again, taking care that each free strand passes over one of the standing strands before entering beneath the next strand. The ends are now again further tapered, and the process repeated a third time. All ends are now clipped off short after the splice has been well hammered, and then fine spun-yarn is bound round the joint. Binding with spun-yarn, when done the reverse way to the lay of the rope, is called serving. These instructions and the illustration shown in 11, if followed carefully, will enable us to make a good, strong eye splice.

11. The eye splice

To make a splice or join between two ropes, the ends of each must be unlayed, or unravelled, for a few inches. Then we fit the ends of each rope accurately together, so that the ends of one lie between the ends of the other. This is called crutching, or marrying the ropes. We now pass each strand over one strand of the opposite rope, and tuck it under the next strand. When this has been done once with each strand of each rope, as in picture 12, we taper the ends a little, and repeat the process a second time. We finally clip off the ends, and, if necessary, tie round with spun-yarn. A long splice is used where no increase in the circumference of the rope is required. To begin with, each rope must be unlayed about three times as far as for a short splice.



12. Marrying a rope

Then the parts are married, as in making a short splice. Now we take one of the strands of the right-hand rope, and unlay it still further, filling up the groove thus made with the corresponding strand of the left-hand rope. This must be done till only a short end of the left-hand strand remains free. We repeat the operation on the left-hand rope, filling up with the corresponding right-hand strand. We now have two long strands in the middle, and at some distance on each side of them there will be a very long strand and a very short one. We deal with each of these three points separately. We divide the strands at each point, and tie the corresponding divisions together, then take the ends at each point thus formed, and tuck them under the second strand, having passed over the first one. We must taper the ends, and tuck them a second time over a strand and under the second from it, then hammer and stretch the rope well, and cut off all loose ends. We ought now to have a rope almost as strong as if there had been no splicing, but as if it had been a rope made solid from the start.

HOW TO PREPARE A DAINTY TEA

EVERY girl, at one time or another, wants to give a tea-party, and she is anxious, of course, to make that tea-party a success. But it is not every girl who knows how to entertain her friends, even in this simple, delightful way. How should we set about it?

Of course, when we have invited our friends, and the day comes round, it is easy enough to find a confectioner's shop and to order some of the dainty cakes that will surely be on view there. But suppose we wish to be absolutely independent of pastry-cooks and confectioners, or suppose we are miles away from any shops. Be that as it may, we must make up our minds to be our own pastry-cook and confectioner, and make our own cakes.

Is that impossible? Not at all. With due amount of care, and provided that we do not undertake anything too elaborate, we can certainly turn out quite a charming little afternoon tea.

Suppose we arrange our little menu something after this fashion, the quantities, of course, depending entirely upon the number of guests expected:

Green butter sandwiches	Egg and anchovy sandwiches
One large cake	Small chocolate cakes
Small cakes	Almond jumbles
Brown bread and butter	White bread and butter

In cutting bread and butter, which must be our first consideration, we should always have two knives—one to butter with, the other, and the larger, to cut the rounds. And if the butter be hard and difficult to spread, it should be cut in pieces and warmed just to the right degree of softness, but on no account until it becomes liquid.

To make the green butter sandwiches, we pick the leaves from the stems of some fresh watercress, then, after being dried in a clean cloth, they must be chopped small. Now we take an ounce of butter, and with a knife mix the two well together, and add a small—the very smallest—pinch of cayenne pepper. This green butter should not be made until the day on which it is to be used, and the sandwiches are greatly improved if four sardines are skinned, boned, and mixed up with it. The

mixture is then spread on the bread, and made into neat sandwiches carefully cut into uniform size and shape.

To make the egg and anchovy sandwiches, we take two, three, or four eggs, according to the quantity required, and boil them hard. If they be placed in a vessel of cold water, they generally peel more easily than if operated upon as soon as cooked; also, it should be noted, eggs which are a few days old peel more easily than those that are very freshly laid. The yolks are separated from the whites, put into a basin, and well mashed with a fork, and a little anchovy paste or sauce is added to them and well mixed. This mixture must be covered until required for use. It should not be made until the day it is to be eaten. The sandwiches are made, shaped, and garnished in the same way as those already described. Sandwiches, and bread and butter too, when cut, should not remain uncovered any considerable time between the making and the eating. If necessary to prepare them some time in advance, the covers of vegetable-dishes may be mentioned as handy to place over them, or anything else that will effectually keep the air from drying and hardening them.

We must now turn our attention to the sweeter items—the cakes. Delicious little chocolate cakes may be made by mixing four ounces of flour, four ounces of sugar, four ounces of butter, a teaspoonful of baking-powder, and two eggs. We put all the ingredients together, beating the eggs separately and adding them last. We mix these well, and place them in a well-greased baking-tin. The mixture will require from a quarter of an hour to twenty minutes in a hot oven. When *quite* cold, cut it into strips and divide to half the thickness; spread a thick layer of chocolate mixture on the one half, and place the other half on it very neatly and carefully. The chocolate mixture is made by melting some sticks of chocolate in a little hot water to the consistency of very thick cream. If preferred, the cakes need not be split to half the thickness, but the chocolate can be poured over the top. Where this is done, the enthusiastic young cook may choose further to adorn with some pretty sweets placed upon the chocolate before it sets, or to use a preserved cherry for each strip.

For another dish of small cakes, we take the weight of two eggs in flour, butter, and sugar, and a quarter of a pound of currants, mixing all together thoroughly with one teaspoonful of baking-powder. If the mixture is scarcely moist enough as it stands, a small quantity of milk may be added. The young cook, however, should be careful on this point, as the tendency is to make cakes a little too moist.

To make the almond jumbles we must beat a quarter of a pound of butter to a cream, then add to it a quarter of a pound of castor sugar. We next mix separately two ounces of almonds beaten to a paste with the juice of a lemon, and one half-pound of flour. The whole is then thoroughly stirred together and mixed, made into small cakes, and baked for about a quarter of an hour.

The receipt for the large cake is omitted, as in almost every house there will be some favourite and long-tried recipe. But it may be well to add that the young cook must be very careful in baking her cake, the tin must be thoroughly greased, and for the first quarter of an hour after the cake has been placed in the oven it should not be looked at, to give it a fair chance to rise before the opening of the door sends a draught of cold air upon it.

It need scarcely be added that everything must be arranged as daintily and prettily as possible, and flowers placed here and there.

THE ROOM THAT IS ALL WRONG

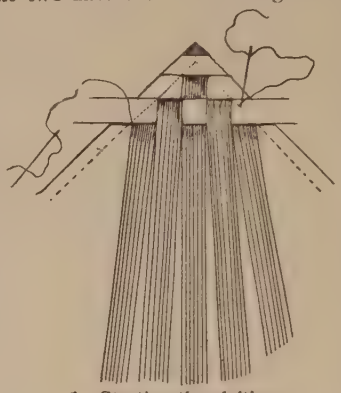
ANSWERS TO THE PICTURE-PUZZLES APPEARING ON 3175

On page 3175 we have a picture of the interior of a room with seventeen things drawn wrongly in it. Here is a list of what they are. The door by which we enter the room has the finger-plates and handle and keyhole on the wrong side, being against the hinges. Going round the room we notice, first of all, the pictures: the oval picture is hanging from a hook which is placed upside down on the picture-rail; the next picture, a landscape, is upside down; and the one hanging in the corner has no hook at all. Looking down, we notice that the skirting board is reversed. We shall be surprised to find that the maid is about to shovel on to the gas-fire some coal she has taken from a coal-scuttle which has quite an impossible handle. This handle is round the bottom of the scuttle in such a way that it could not possibly be swung round for the purpose of lifting the scuttle.

The hands of the clock are wrong, as the little hand would point to a minute or so past the hour instead of just before it, if the minute hand was at the quarter past the hour. Let us go and look at the window. The fastener is the wrong way round, and the handle by which we lift the lower half has been fixed on back to front. Casting our eyes upwards we notice that the support for the curtain-pole is fastened on the top instead of at the side, which would prevent us putting the pole over it, and the knob by which we open the shutter is on its wrong side. Moving round the room we come against a hassock, the lugs of which are on the sides instead of on the ends. Let us take it up and we shall notice how very awkward it would be if hassocks were always made like this one. There is something strange about the dog too. It is a spaniel with a collie's tail. The chair behind it has been very carelessly upholstered, for the pattern is the wrong way up; the castor has been fixed on the wrong way round, and it would soon break with the weight of anyone sitting in the chair. Lastly, the floor-boards have been placed in in the wrong direction, and what would happen to them underneath the carpet is impossible to say.

A RIBBON CUSHION-COVER

Ribbons are now obtainable in many shades of colour and in several materials. Besides being used for the ribbon embroidery work, they may be plaited. We propose to make a cushion-cover with plaited ribbons, a dainty one which is suitable for a drawing-room chair or a chesterfield. We shall want two different coloured double satin ribbons ⅜ of an inch wide. Two colours which combine well are pink and pale green. Other combinations of colours look well, such as pink and grey, heliotrope and violet, cream and bronze, or three shades of blue or of green, the choice being determined by the prevailing colour of the furniture and decoration of the room the cushion-cover is to go into. The quantity required depends upon the size of the cushion. The half "piece" of 18 yards is enough.



1. Starting the plaiting

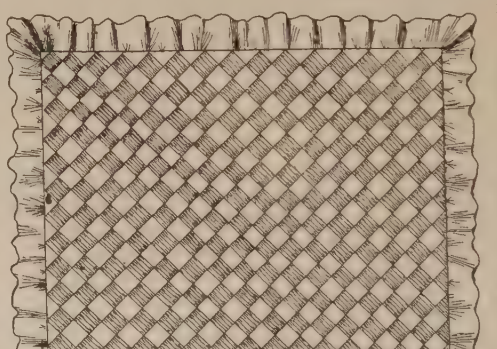
We intend using the plaited ribbon on one side of the cushion only. The back of the cushion-cover will be of cotton-backed satin or sateen in plain pale green or pink, to match one of the ribbons.

Having cut out the silk for the back of the cushion-cover, we set about arranging the ribbons. Picture 1 shows how the two ribbons are plaited together. The pattern is simple enough, but care is needed to lay the ribbons down across the cushion evenly, and to cut them precisely the right length, so that none is wasted. The longest strips are laid across from the left top corner to the right bottom corner before plaiting begins. The ends are shown loose in the picture. Suppose we start with a pink strip in the left top corner. We stitch this down to the back of the cushion-cover and lay a piece of the green ribbon over it, stitch the two ends down on the left side and on the right, and cut off both ends close enough up to leave room for stitching on a frill or braid later. This is the shortest length of green ribbon we shall use; but the pink one underneath goes right across the cushion to the opposite corner.

In the next row two pink ribbon lengtns are started, and a green ribbon is plaited over them both, and under the first one coming from the corner. As we proceed we plait more and more, each row, until the top and left sides are ended, and then plait shorter and shorter green lengths till the bottom and right sides are finished.

It should be said that the pink ribbon appears darker than the green in the picture, to distinguish between the two. The edges of the ribbon lengths should just touch. It will be found that the ribbon should not be cut till it is stitched down, that the stitches must be small and neat, and that the ribbon must be cut slantwise. The corners will need special care, for here, if anywhere, the ribbon is liable to bulge and refuse to lie flat. But a little coaxing and the use of a sharp pair of scissors should bring about a good result. Two needlefuls of silk will be in use at the same time, one for the left side and bottom, and one for the top and right side of the cushion. Nowhere must spaces appear in the plaiting. The ribbon has to cover the whole surface, but it must not be stitched on to the cushion anywhere.

When the plaiting is completed we make a frill of silk to match the green or pink, and run it on to the cut ends of the ribbon, round the edge of the cushion-cover on its under side, so that the stitches are invisible from above. Now our cover should look like that shown in picture 2. If preferred, a silk cord can be run along the edge instead of the frill, and loops of it made at each of the four corners of the cover. This plaited work can be done with sarsnet ribbon or braid, and the back of the cover can well be made of sateen. This would, of course, cost less than the cushion-cover described above. But, whatever materials be chosen, the ribbon should not be too flimsy, or we may be quite sure that it will wear out quickly, and all our work be lost. We can make other articles in plaited ribbon-work, such as handkerchief-sachets, tea-cosies, nightdress-cases, mats, and table-centres. Washing-ribbons are now manufactured, so that there need be no fear of the article being spoilt in the laundry.



2. The finished cushion-cover

THE NEXT THINGS TO MAKE AND DO ARE ON PAGE 3387.

READING

MORE PRONOUNS AND VERBS

CONTINUED FROM 3136

It is quite a long time since we had any proper sentences to read. We were so busy learning about HE, SHE, IT, and all the other little words, that we forgot to have a real reading lesson. We shall be surprised to find how we have been getting on with our reading all the time, though we forgot all about it in our last lesson. Here are some words that we shall be able to read quite by ourselves :

The BLACK PEN is MINE.

The LARGER of the two BOOKS is THINE.

This PRETTY GARDEN is HIS.

That WATCH is HERS.

Do you see that HOUSE ? It is OURS.

Is the BROWN DRESS YOURS ?

I like our DOLLS better than THEIRS.

When you have read all those through, look back for a minute at the last word in each of the sentences. What do you notice about these last words ? That they save us the trouble of using a whole lot of other words : one little word does instead of several. In the first sentence, if we could not use the little word MINE, we should have to say : The black pen is the pen belonging to me ; and in the second : The larger of the two books is the book belonging to thee, and so on. So because these words MINE, THINE, HIS, HERS, OURS, YOURS, THEIRS stand " for nouns," they must be PRO-NOUNS, just like our old friends HE, SHE, IT. Only the pronouns we have just been learning are called Pos-ses-sive, because they show that the persons possess, or have certain things. The pronouns that we learned in our last lesson were Per-son-al.

Now, suppose I shut my two hands tight, and held them out to you and said : " Now, which of my two hands will you have ? " And suppose you had been watching very sharply and seen me slip a piece of chocolate into *this* hand, and a little stone into *that* hand, you would answer, like a shot, THIS. And, do you know, when you said THIS you were really and truly using a pronoun. Yes, and a new sort of pronoun, too. You never thought you were doing that, did you ? And because THIS and THAT are used when we wish to point out something (though we are taught it is rude to point), they are called Pointing-out pronouns, or (if we wish to sound very clever) De-mon-stra-tive, which just means " pointing out." Have you read any of " Alice in Wonderland," or " Alice Through the Looking-glass " ? If so, you will know something about Tweedle-dum and Tweedle-dee. Here is more about them :

YOU have heard of Tweedle-dum,
YOU have heard of Tweedle-dee,
WE are both so much alike, that
YOU can't tell HIM from ME ;
How handy IT would be if one were
thin and one were fat,
For then you'd say at once : " Why,
THIS is THIS, and THAT is THAT."

It is really very awkward when WE
both begin to dress,
Our clothes are so alike that we get in
a dreadful mess;
When I say "Tweedle-dum, my dear,
I'm sure this coat is MINE,"
HE always answers "Tweedle-dee, how
can my coat be THINE?"

Now we are coming to something new. We will begin by asking ourselves a few questions, and trying to read the answers.

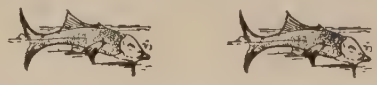
How do babies move about before they are able to walk? CRAWL

What do they do when they have grown a little bigger? WALK

What do you do when you want to get home from school quickly? RUN

How would you travel if you were a bird? FLY

And what do the little fishes do when they are asked out to tea? SWIM



And what do you do when you play hopscotch? HOP

Now, if you look at all those words that are printed in big letters, you will see that they all mean "doing something." They are not names of persons or things, like *man* or *table*. How silly it would be, when you were asked "How would you travel if you were a bird?" for you to answer "Table." And how everyone would laugh if, when you were asked "What are you sitting on?" you said "Swim." These two kinds of names are quite different, you see, and they must not be muddled up.

Now, we learned that the first kind of words was called NOUNS, and we had better learn for this lesson that this other kind is called VERBS. Every word that tells us something about what a noun is or does is a VERB. I think you will understand it quite well if we read a few more sentences together.

Cinderella LOSES her shoe.

Here LOSES tells us what Cinderella did, and so it is a verb. Cinderella, being the name of a person, is a noun.

St. George KILLED the Dragon.

In this sentence KILLED tells us what St. George did, and so it is a verb. In the next sentences, I am sure you can all pick out the verbs if you try:

Mary HAD a little lamb.
Who KILLED Cock Robin?
Tom, Tom, the Piper's son,
STOLE a pig, and away he RAN.
A stitch in time SAVES nine.
A soft answer TURNETH away wrath.
The Lord IS my shepherd: I shall not
WANT.
God IS love.
We LOVE Him because He first
LOVED us.

There is just one other thing that I must tell you, and that is, there must be a verb in every sentence. If you try to make a sentence without a verb, you may "try, try, and try again," but you won't succeed. Even in sentences with only one word in them, we find that word is a verb; such as HARK, LOOK, COME.

Now try to find all the verbs in this rhyme:

Hark, the clock strikes one, two, three,
We must give the dolls their tea.
Hark, the clock strikes four, five, six,
Nurse is calling Reg and Trix;
Now it's striking seven and eight,
Hurry up, or we'll be late.
By the time the clock strikes nine,
You're in your bed, I in mine.
But when the big hall-clock strikes ten,
I'm not awake to hear it then.
Eleven ends the big folks' day,
At twelve the fairies start their play.

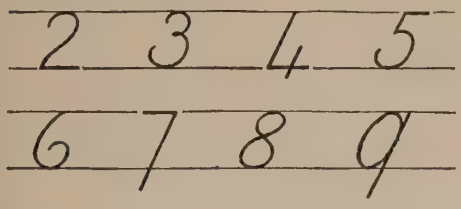
TOM AND NORA LEARN TO WRITE FIGURES

"BEFORE writing anything new, let us see how you remember all the capital letters, writing them in the order of the alphabet," said Tom and Nora's mother at their next lesson.

When they had written all the letters like that, they took two pairs of nail-scissors, cut the paper into squares with a letter on each, and asked each other the names of the letters.

"There is something very different to learn to-day—we are going to make figures. It is quite as necessary to make good figures as letters," said the children's mother. "You can make 1 and 0 already."

Tom and Nora had learned how to count, so they watched their mother write these figures:



"So many people make bad figures, and then mistake them for each other; but much trouble might be saved by making figures clear and plain without flourishes. Before beginning to write, let us talk about these figures. Tell me what you see."

Tom noticed the figures were all between the lines except 7 and 9, which had strokes for tails below the line. Nora saw that 3 and 5 had their lower parts quite alike, but 3 had a smaller curve for the upper part, while 5 started with a short down-stroke and had a cross-stroke from the top of that to the right. Both decided that 7 must be quite easy to make—just a line to the right and a down-stroke, and that 9 was like 0 with a short stroke and a tail to the right of it.

"What about 4? Let us look at it upside down."

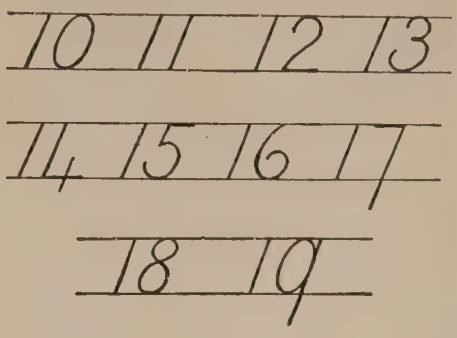
"Like a short 7 with a stroke through," said Nora. "Four is almost as easy as 7."

"6 is a curly tail," said Tom, "and 8 is like two little circles. Where does it begin and end?"

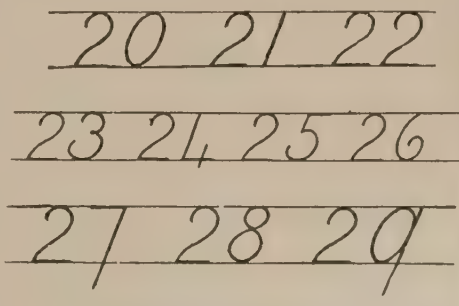
Nora said 2 reminded her of capital Q, but was ever so much smaller.

Then Tom and Nora took their pencils and copied rows of their mother's figures. They were puzzled to know where 8 started, but were told it should begin near the top at the right and curve up and round to the left, then down and round to the right to form the lower circle to join the beginning, and ought not to start the other way, for that would be like trying to wind a skein of wool from the wrong end. Nora smiled, for she had tried to do that very thing the day before.

When all the figures were nicely made, the children were shown how to put 1 before each figure to make the numbers 10 to 19, using the figures they already knew, just like this:



"Make the 1 quite distinct; never join it on to the next figure; and never start making it with a little stroke before it, for then it might be mistaken for a bad 7. The numbers from 20 to 29 are written with 2 before.



"In the same way we may use 3 for the thirties, 4 for the forties, 5 for the fifties, 6 for the sixties, 7 for the seventies, 8 for the eighties, and 9

for the nineties. All the other numbers are formed with the ten figures you already know."

For several days Tom and Nora practised making figures, and their mother gave them each a box of small square pieces of blank card, on every one of which they wrote a small letter, a capital letter, or a figure, and played at putting them together to make little words. At this time they were learning to spell short words, and so when their friends came to tea they brought out the boxes of their own letters, made words with the letters, and gave them to each other to find out the words they spelled. The one who made the most right words won the game. With the figures they made each other little sums to do, and sometimes they had a writing competition to see who could make the best and neatest letters in the shortest time.

Their mother was so pleased with their progress that she said they were ready to write words and little sentences, and that they should start to do so at the next lesson, and use pen and ink.

ARITHMETIC

SUBTRACTING SEVERAL NUMBERS AT ONCE

In this lesson it will be well to go back for a while, and learn a little more about subtraction.

In Lesson 9 we saw how to subtract *one* number from another. Let us see whether it is not just as simple to take away several numbers at once from the other number.

The method we used for subtracting 347 from 635 was this. We placed 347 under 635, so that units were under units, tens under tens, and so on. Then we found what must be *added* to 347 so as to make 635. First, we made 7 up to the next number ending in 5—that is, 15, saying 7 *and* **8** make 15, and writing 8 in the answer. Next, the 1 of the 15 (which is 1 *ten*) makes the 347 into 357; so we went on, 5 *and* **8** make 13. Put 8 in the ten's place of the answer, and carry the 1 of the 13. This 1 is 1 hundred, and we therefore had 4 hundreds in the lower number, which required **2** more to make 6.

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635
347
---
288
```

Now, by using this same method, we can easily take away several numbers at once from a given number. We have only to add the several numbers together, and make the total up to the other given number. An example will make this clear.

Take away the sum of 349, 17, 1241, and 406 from 5927.

Write the numbers down exactly as for an addition sum—that is, place all the unit's figures in a column, so that tens come under tens, and so on. Put the number 5927, from which the others are to be taken, first; separate it from those below by drawing a line under it. Next, add together the unit's figures of the numbers which come below this line. Say, 6 and 1, 7; and 7, 14; and 9, 23; or, what is better still, say only, 6, 7, 14, 23. Now, having found the total, 23, we have simply to say how much must be added to 23 to make it up to the next number above 23 which ends in a 7 (since the unit's figure of our top line is a 7). This number is, of course, 27, and we know that 4 must be added to 23 to make 27. We write 4 in the answer, and carry the 2 (tens) of the 27 to the next column.

```
5927
----
 349
  17
1241
 406
----
3914
```

We now repeat the process with the ten's column, saying 2, 6, 7, 11, *and* **1** *make* 12. Put 1 in the answer, and carry the 1 of the 12 to the next column. Next, for the hundred's column, we have 1, 5, 7, 10, *and* **9** *make* 19. Put down 9 in the answer and carry 1. Finally, 1, 2, *and* **3** *make* 5. Put down 3.

We see, then, that when the given numbers are subtracted from 5927 we have 3914 left. We can test whether our answer is right by adding together all the numbers except the 5927. If the working is correct the answer, 3914, and the four numbers 406, 1241, 17, and 349 will make the number 5927.

This perhaps sounds rather difficult, but it only appears so because the explanation is long. The process is quite as easy as an ordinary addition sum. In the following example no

more has been written down than we actually say to ourselves in working the sum.

How much is left after 528, 1102, 347, and 129 have been taken away from 3016?

```
3016
----
 528
1102
 347
 129
----
 910
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Say, 9, 16, 18, 26; and **0** make 26. Carry 2. 4, 8, 10; and **1** make 11. Carry 1. 2, 5, 6, 11; and **9** make 20. Carry 2. 2, 3; and 0 make 3.

As we come to each figure in heavy type we write it in the answer.

It may happen that all the numbers to be taken away are the same. In that case we can use our multiplication table.

How many marbles will be left out of 850 after 5 boys have each had 133?

Instead of writing 133 five times, we write it once, and place a 5 under its unit's figures, exactly as we do for multiplication. In fact, we are simply going to multiply 133 by 5, and make the result up to 850. Thus, we say, five 3's, 15; and **5** make 20. Carry 2. Five 3's, 15; and 2, 17; and **8** make 25. Carry 2. Five 1's, 5, and 2, 7; and **1** make 8. So, the result is 185.

```
 850
----
 133
   5
----
 185
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The following examples are to be worked in the way we have shown:

1. Take the sum of 782, 6031, 13, and 519 from 8207.

2. Find the remainder when 3912, 4608, 353, 97, and 1029 are taken from ten thousand.

3. Add together 129, 1008, 36, 508, and take the result from 3021.

4. Subtract 7 times 154 from 2540.

5. Subtract 8 times 643 from 5162.

MUSIC

THE "SLEEPY ARM" GAME OF THE FAIRIES

To-day we are really going to think about the best way of getting the piano fairies to talk to us. They are very particular little people, and it is quite right to be particular, for there is always a right way and a wrong way of doing things, and we must be careful always to find the right way.

If we approach the fairies' kingdom—in other words, the piano—in the proper way, their voices will sound really beautiful; but if we *hit* the notes instead of loving them we shall get very little beauty from them.

How we should sit to play the piano

First of all, we must find our seat, and we must place it so that when we sit on it we shall be immediately opposite the middle of the piano, and the seat must be far enough away to allow our elbows to be in front of our body. Now we will put our hands on the notes, but we will not press them down just yet. We have to be so sure that our fingers are rounded, that the back of the hand is quite level, and that we have a horizontal line from the elbow to the fingers. This must be our position when we play the piano. The little girl in the picture on page 3133 is not sitting in at all the right way.

The fairies know that all this is so important, they are very anxious for us not to forget, so we will make ourselves very safe and sure by saying it all over again.

1. Our seat must be immediately opposite the middle of the pianoforte.

2. We must sit far enough away from the piano to allow our elbows to be well in front of our body.

3. Our fingers must be nicely curved, so that we touch the notes with the little fleshy tops which Nature has given to us.

4. We must have the back of our hand quite level, and a nice horizontal line from the elbow to the fingers.

If we think of all this, and watch ourselves very carefully, the fairies will be very pleased Even now they are anxious for us to feel quite happy, and not at all tired, so they say that if our legs are not quite long enough to reach the ground, we must have a footstool for our feet. Do you not think they are very thoughtful little people ?

They have something else they want us to do to-day, as well ; they say we must have a very *loose* arm, and a very *loose* wrist. When we want to walk we do not make our legs as stiff as a board, do we ? We just let them move easily, and that is how we must walk on the piano, only we shall use hands and arms, instead of feet and legs.

Here is a little game which the fairies want us to play. They have a funny name for it, they call it "The Sleepy Arm." We can come away from the piano, and sit down anywhere we like for a change. We let our hand rest quite easily on our lap, then we throw it up above our head and keep it there while we count 1, 2, 3, 4.

Directly we have said "four," we pretend we go fast to sleep, and our arm will drop. It must be quite limp, just like it would be if we were asleep. Its own weight makes it fall, like a ball drops to the ground after we have thrown it up into the air.

Shall we see how easily we can make our arm play at being asleep before our next little talk ? We will play this game ever so many times each day, for the more often we play it the more free will our arm become.

The fairies think we ought to have a story as well as a game, so here it is :

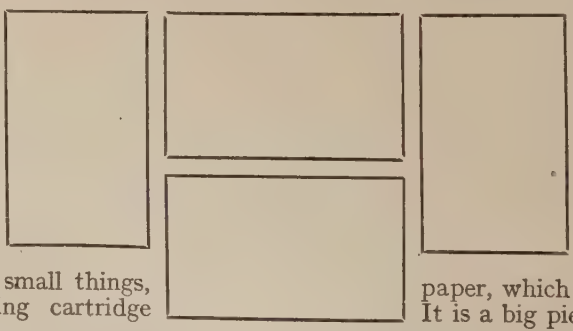
In the ever so long ago, there lived a little boy who loved the music fairies with a great and wondrous love. He had a toy which was his great delight—a wee orchestra of trumpets, horns, drums, and Jews'-harps. The father was not quite so fond of the music fairies, and tried to make his little boy forget all about them ; but this was quite impossible, for when music was forbidden our poor little friend was very, very sad.

But there was a kind "somebody" who knew how the little one was fretting to hear the music fairies tell their sweet stories, and this kind someone managed to smuggle a clavichord into a garret in the top of the house. A clavichord, of course, was a musical instrument, which came before the pianoforte. There was one very funny thing about it. The lower notes which on our piano are white were black, and the upper notes which on our piano are black were white. It seems a funny instrument to us, but it made our little friend so happy, for he taught himself how to play. He used to go to the churches and hear beautiful music, and then he would come back and run away to his little garret, where his beloved clavichord lived, and persevere till he could make the fairies sing sweet songs to him. This little boy was George Frederick Handel, one of the greatest composers this world has ever seen.

DRAWING

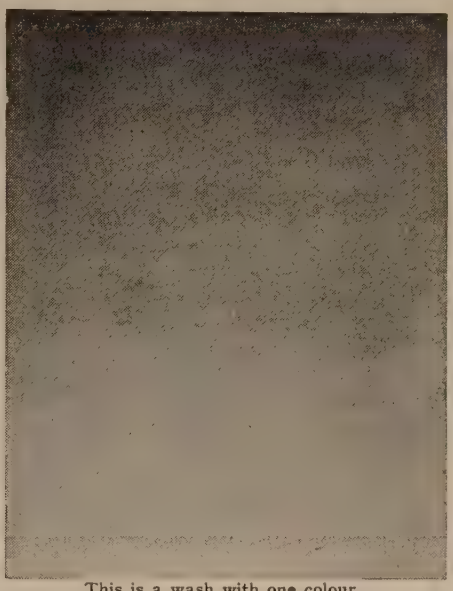
PUTTING ON A GRADUATED WASH

IN our painting lessons we have always pinned our drawings on our boards. If our paper has been thin, or if we have soaked it too much, we have sometimes found it crinkled on the surface, which, of course, spoils a flat wash. When we are colouring only small things, and are using cartridge paper, this need not happen if we are careful to damp all the surface equally, and not too much ; but when we want to colour big things very nicely, we can try another sort of paper, and fix it to the board in a better way.



We will get a sheet of water - colour paper, which costs ten cents. It is a big piece, so we will

only use half of it to-day. Now, we shall want some Stickphast Paste, or some very strong gum, with a brush or a sponge. We must take our paper and thoroughly soak it in cold water—the bath is the best place to do this. Then we must lay it on the board, and after squeezing the sponge well, press out some of the water in the paper all over with it till it lies quite flat. Then we lift up the edges and paste the board about an inch underneath the paper all the way round, then press the paper down and leave it.



This is a wash with one colour

We have only made our flat washes in one colour all over, so far, even when we changed primary colours into secondary and tertiary colours. Now, we are going to put different shades of the same colour on one part of our paper, and two colours together on the other part. We will first rule some oblong shapes on the paper. An oblong, of course, has two sides longer than the other two. We make the short sides three inches, the long sides five inches. We rule four oblongs, two with short sides at the top and bottom, and two with long sides at the top and bottom, in the position in which we see them on page 3292. We will paint our first oblong in blue to match the sky; but we cannot put in any clouds yet.

We must just slightly damp the surface of the paper and blot it in the usual way; then we must take a brush quite full of blue paint, just wet enough to work easily, and paint one row along the top of the first oblong. For the next row we must dip the brush in clean water first, and then in the paint, and repeat this to the bottom. This fresh water, mixed with the colour, will make it paler each time, till at the bottom row it is quite light—as if Oxford blue were at the top and Cambridge at the bottom. This is called putting on a graduated wash. We learned something about it on page 493.

We try this again on the other oblong, choosing a mixed colour—green or violet—mixing plenty, because we cannot match the colour again. On the two other oblongs we will use two separate colours. We can take two colours from the sunset sky—cobalt blue to light red, beginning with the blue as before; but half-way down we wash the brush and take a little light red, mixed with plenty of water to make it paler, and paint across next to the blue. The blue edge will melt into the first red edge, and as we go downwards the red shows by itself till it grows almost white on the bottom line. We will do the same thing with two other colours on the oblong that is left.

Sea and sky made with Indigo and Cobalt

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Aujourd'hui nous irons à Versailles, où demeurait une fois une belle reine.
To-day we shall go to Versailles, where dwelt a time a beautiful queen.
To-day we are going to Versailles, where a beautiful queen once lived.

Nous arrivons à deux heures, et allons en voiture au palais, un édifice splendide.
We arrive at two hours, and go in carriage to the palace, an edifice splendid.
We arrive at two o'clock, and drive to the palace, a fine building.

Nous traversons les chambres et regardons les beaux ameublements.
We traverse the rooms and regard the beautiful furniture.
We walk through the rooms and look at the beautiful furniture.

Il y a beaucoup de tableaux sur les murs. J'aime les tableaux de batailles.
It there has much of pictures upon the walls. I like the pictures of battles.
There are many pictures on the walls. I like the battle pictures.

Nous voyons de drôles de lits. Ils ont un petit escalier sur le côté.
We see some droll of beds. They have a little staircase upon the side.
We see some funny beds. They have a little staircase by the side.

Les lits sont si hauts qu'on doit monter deux marches pour se coucher.
The beds are so high that one must to mount two stairs for oneself to go to bed.
The beds are so high that one has to go up two steps to go to bed.

Nous quittons le grand palais, et nous entrons dans Le Petit Trianon.
We quit the great palace, and we enter into the little palace.
We leave the big palace, and we go into Le Petit Trianon.

La reine et ses amis demeuraient ici quelquefois dans de petites maisons.
The queen and her friends dwelt here sometimes in some little houses.
Sometimes the queen and her friends lived here in little houses.

Jeannette arrache un peu de lierre de la muraille et le met à sa robe.
Jenny plucks a little ivy from the wall and it puts at her dress.
Jenny plucks a little bit of ivy from the wall and puts it in her dress.

Nous n'oublirons jamais le jardin de la malheureuse reine, Marie Antoinette.
We (not) shall forget never the garden of the unhappy queen, Marie Antoinette.
We shall never forget the garden of the unhappy queen, Marie Antoinette.

THE NEXT SCHOOL LESSONS BEGIN ON PAGE 3369

THINGS THAT CREEP & CRAWL

CONTINUED FROM 3264

IT is quite a good game to take a big bunch of keys and find the locks which all the keys fit. A key of itself is a useless bit of steel; but if it can be made to turn a lock it becomes an article of value. Naturalists find the same satisfaction, only on a larger scale, in fitting the little things of the animal world to their purposes in life. The keys were made to fit locks, and we, taking them as they come, have to find their places. Nature has a purpose for all her creatures, and it is for us to discover what that purpose is.

Some of Nature's creatures seem to have departed from the work for which we imagine them to have been created. We cannot think that flies and mosquitoes were made to inflict death upon men and beasts. They have departed from their original purpose, we think, just as men who thieve and kill other men have departed from their original purpose. On the other hand, we think that many things in the animal world are horrid, if not harmful, when really they are quite good friends to man. Most of us dislike creepy, wriggly things. Centipedes and spiders are among the things which fill most people with horror. Well, we must do with them as we have done with so many other things, examine the purpose which they serve in life, and realise the value of the part they play in the scheme of creation. First let us look at the centipedes—those long-bodied creatures with many legs which we find hiding in dark places, under stones, behind the bark of trees, and so on. When a centipede is discovered, a child generally feels as if it must crush the miserable thing.

To do so is foolish, for the centipede of this country does only good. It devours worms and insects, and is a check upon the too rapid increase of these. Many of the centipedes are blind. Those that have eyes can distinguish light from darkness, but little more. The antennæ supply the place of eyes. With these they feel their way along the ground, and discover things good for food. All the centipedes are flesh-eaters, hence the value in the garden of those that live in this country.

Northern centipedes are small compared with those that flourish in tropical lands. But we notice a peculiarity about ours which distinguishes foreign centipedes as well; they all have many pairs of legs,

but the number of pairs is always odd. Centipedes never have a dozen pairs or a score of pairs, or even a hundred pairs; they never have anything but odd numbers of pairs, whether it be fifteen or 121 pairs. Many people cannot tell the difference between a centipede and a millipede. There is a distinct difference. The centipede has one pair of legs to each segment of its body; the millipede has two pairs of legs to most of the segments of its body.

CENTIPEDES THAT EAT FLESH AND MILLIPEDES THAT EAT HERBS

The centipede is, as we have noted, always a flesh-eater; the millipede lives only on vegetable food. A further distinction between the two may be noted in the shape, for whereas the body of the centipede is flattened, that of the millipede is shaped like a cylinder.

There are only two classes of centipedes, but the families included are numerous and they vary a good deal. The most famous are those which live in the hot countries of South America. These may well terrify people, for they grow to a length of twelve inches, and their bite is poisonous—not poisonous enough to kill a man, but bad enough to cause him pain. They live in hiding all through the day, but where human beings are, these great creatures creep into bedding, boots, gloves, and other clothing. A man goes to put on his boot, and finds a huge and savage centipede inside, which promptly bites him, and causes a bad swelling on his foot. Of course, creatures like these are much hated by men, but they do good work when left alone. devouring multitudes of cockroaches, beetles, and other unpleasant and injurious things.

A GIANT CENTIPEDE IN LONDON THAT FED UPON MICE

It is hard to say what they will not eat. They have been known to devour lizards bigger than themselves, and one kept at the London Zoo fed upon mice. Other centipedes may be found hiding near the seashore, while others live down in the soil like the worms upon which they live. To the earth-worms these centipedes must seem like terrible boa-constrictors, for the centipedes twine themselves round their victims while they eat them. The millipedes lack the poison duct which the centipedes have, and they possess only two pairs of jaws—half the number owned by the centipede. There are many sorts and sizes of them, but they are all harmless, unless they neglect their task of eating waste vegetation, and take to destroying useful plants. Two curious forms are the slug millipede, a creature with an enormous number of legs, which can roll itself up, and the pill millipede, which curls itself up like a tiny hedgehog. For that reason it is sometimes confounded with a totally different little animal, the wood-louse. This belongs to the same family in Nature as the crab and the shrimp, being a crustacean, though it lives on land.

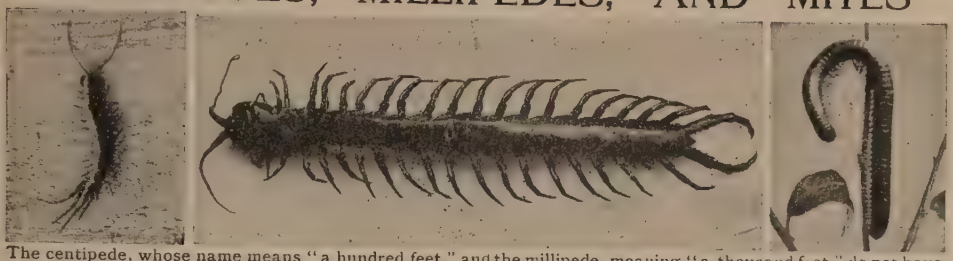
There are about 250 species of wood-lice, but the one which we may notice here is that one which, as soon as it is touched, converts itself into a little ball. We need not stay to discuss it here, but must just note in passing that the life-story of this humble little animal is one which causes wonder to learned men. Its habits are the source of much trouble to gardeners, especially English nursery gardeners, who grow things in hothouses for market.

THE SERIOUS DAMAGE THAT THE WOOD-LOUSE DOES IN OUR GARDENS

The wood-louse is one of the worst foes of the man who grows costly maidenhair fern. The creature loves the tender shoots of the fern, and, taking itself and its family of little ones to the root of a plant, there it settles and secretly gnaws away at the stalks, sucking out the vital juice of the plant.

The damage that these crustaceans do in this way almost passes belief. They cannot always be killed by putting down stuff to destroy insects, for that would be too costly, and the same things which kill the wood-lice may at the same time kill the plants. The only thing to do seems to be to take each pot separately and shake out the wood-lice which it contains, and kill them. Think what a task this means when a nurseryman has thousands and thousands of pots. Before the pots can be cleared of their enemies, the latter may have done such harm as cannot be remedied. When the pots have been cleared of wood-lice, the nurserymen have to plan to keep them free. They tried to do this by raising on tins the wooden staging on which the pots stand. But, as soon as

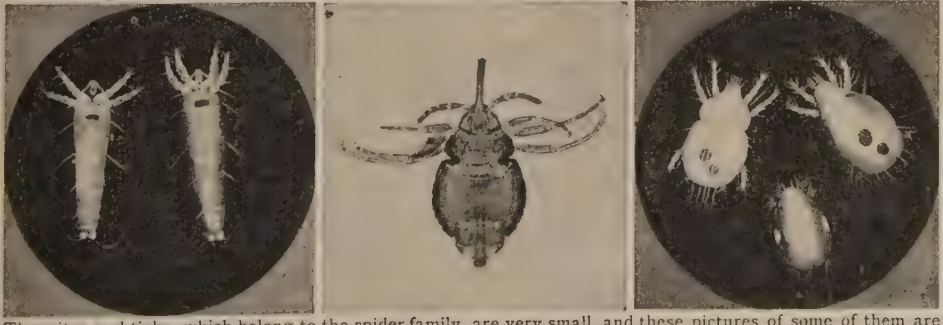
CENTIPEDES, MILLIPEDES, AND MITES



The centipede, whose name means "a hundred feet," and the millipede, meaning "a thousand feet," do not have a hundred and a thousand feet; their names are exaggerations. But, as may be seen from these pictures, they have many feet. On the left is the common centipede of our gardens, and on the right the common millipede. The middle picture shows one of the giant centipedes of the tropics, which grow sometimes a foot in length, and their bite is as dangerous as the bite of a snake. These great centipedes have been known to eat lizards and mice.

There is a long, worm-like centipede called the geophilus, a word that means "earth lover," because it lives entirely underground. It burrows like the earth-worm, and its food consists almost entirely of worms. Here we see the thin geophilus grappling with a fat earth-worm, which it has seized, and which it will eat later on.

We should not suppose that the wood-lice, those funny little creatures in our gardens that curl up into a ball when touched, belonged to the same order as the crabs and lobsters. Yet this is so. The wood-lice are crustaceans, but they cannot all roll up; and here we see, on the left, the giant wood-louse, and next to it the common wood-louse, neither of which rolls up. On the right is the pill millipede, that is often mistaken for the pill wood-louse of our gardens. These creatures get their names from the fact that when rolled up they look like big pills.



The mites and ticks, which belong to the spider family, are very small, and these pictures of some of them are greatly magnified. They either ravage our fruits and flowers, like the currant-bud mites of the left-hand picture and the bulb mites on the right, or they prey upon other creatures like the elephant-tick of the middle picture. Small insects, birds, and large animals, all have their pests in the form of mites and ticks that live upon them.

the tins got rusty, the wood-lice crawled up and reached the pots. Then they did away with the tins and used glass jars as supports. But the wood-lice were not to be beaten even by this trick. They crawled up the wooden rafters of the glasshouses, and then, curling up, let themselves drop into the pots below.

AN ENEMY OF THE GARDEN AND GREENHOUSE THAT MAY BECOME A FRIEND

At a single nursery where there are only fourteen greenhouses the wood-lice do damage amounting to $250 a year. Think, then, what damage they do altogether in the hundreds of nurseries of a bigger size, where ferns and other things that they like are grown. If denied ferns and other luxuries, the wood-louse can live extremely well on waste vegetation; and, by eating that, it is a benefactor to man.

We will leave them to their wickedness, and pass on to those interesting "insects," the spiders. As a matter of fact, they are not insects at all. Insects have only three pairs of legs, but spiders have four pairs. They, with the millipedes and centipedes, the scorpions and mites, belong to a division of the animal world not included in the insect family. But, by whatever scientific name they may be called, every child knows a spider when he sees one.

Not every child, however, understands how marvellous is the skill, how extraordinary the character of the work done by the spider. It is the finest spinner in the world. It does not provide silk as good as that which comes from the silkworm, but it provides silk enough to make the most wonderful floating buildings in the world. The fineness and strength of a spider's web can never be matched by man.

THE SPIDER'S WONDERFUL WEB THAT IS STRONGER THAN A FRAME OF STEEL

What is the web, and how does the spider produce it? The web, before it leaves the spider, is a kind of gum. When it issues from the body of the spider, it takes the form of the finest silk, almost too thin to imagine, but stronger, in proportion to its thickness, than steel bars. The spider is generally provided with six tubes—sometimes there may be only four—placed in the lower part of its body. Each of these tubes is more than a tube—each is really the finest of fine sieves. The silk does not come out in one strand from the tube. There are a thousand holes to this sieve that the tube encloses. From each hole the silk comes forth as a separate thread. The thousand threads issuing from each tube combine to form one thread. But there are six tubes we remember. Then the six threads, each formed of a thousand or more threads, combine again to make the one thread of which the spider builds its web.

Every bit of web that we see may contain from 4,000 to 6,000 strands of silk, all woven together to make the finest natural rope in the world. A careful man has calculated that the threads of silk, as they issue from the thousands of holes in the sieves, are so fine that it would require four millions of them to form a silk thread as thick as the hair of a man's beard. So small are the holes in the sieve through which the silk is drawn by the spider that a thousand of them are crowded together in the space covered by the point of a pin.

THE TERRIBLE FEMALE SPIDER THAT EATS HER HUSBAND

We may see the wonders of spider life for ourselves, for every garden has its spiders, and there is no web-spinning spider more interesting than the big fat queen of the cobwebs who dwells on bush and shrub in the garden. It depends on the weather how she will begin. We say "she" because the female spiders are the more important. The males are small, and are more often than not eaten up by the females after the wedding-day. In fact, they may be gobbled up even before the courtship is over. The lady spider is the most terrible sweetheart in the world. We will leave out of account all male spiders, therefore, and watch a female. It depends, we agree, upon the weather how she will begin to build.

She starts by drawing forth a little quantity of silk. This she does by rapidly moving certain very sensitive wavy hairs upon her legs. She fastens the end to the place on which she is standing. Then she may have to run away to another point, to fix the other end of the web there, letting the silk trail out as she runs. But if there is a wind blowing she does as the smaller spiders do—lets her silk float free for the wind to carry it, and cause it to stick to some point where it can be made

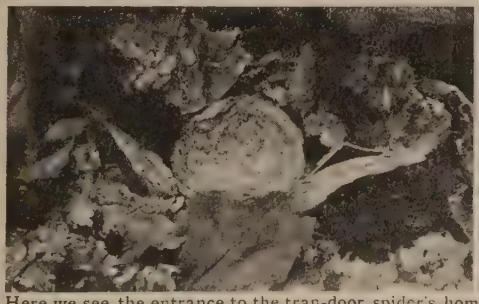
LAND SPIDERS AND WATER SPIDERS

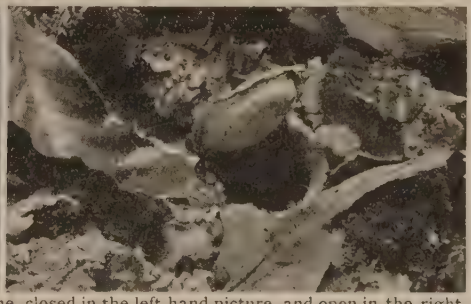
This is the female of the common garden spider. She is much larger than the male, whom she often eats.

The common house spider does not build a beautiful geometrical web like the garden spider, but makes its web flat, as seen here. The web is only too well known in our houses, where the spider spins in dark corners.

The little harvest spider, so familiar in our fields, is not really a spider although it appears like one.

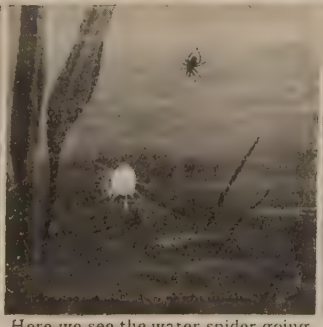
The trapdoor spider, of which we see the upper side on the left, and the under side on the right, is a wonderful little miner. He burrows a shaft, or tunnel, a foot deep and an inch wide, and lines it with silk. Then he makes a little door to the tunnel, and fastens this by a hinge. The spider lives at the bottom of the shaft, as shown in the middle picture, and when he hears an insect upon his trap-door, he darts out in a moment and seizes it.





Here we see the entrance to the trap-door spider's home closed in the left-hand picture, and open in the right

The water spider, shown here, is a most interesting creature. Though born under water, it must breathe to live, and so, when it dives, it carries to its home a big round bubble of air.



Here we see the water spider going down to its dome-shaped home of silk. The entrance being underneath, the spider can fill its nest with air, which is unable to escape.

This is the wonderful raft spider, that makes and floats upon a neat little raft of leaves. When she sees a fly in the distance she leaves the raft and darts after it across the water.

The photographs on these pages are by Miss Cadly, F. P. Smith, D. English, S. Johnson, W. S Berridge, W. P. Dando, P. Collins, and others

fast. The web is sticky, and clings to whatever it touches. Now she has got her tight-rope, and runs rapidly over it, and makes supports in all directions, lines which cross from side to side, fixed at both ends, but all passing through the exact centre of the web. Next she begins at the middle, and works out a spiral pattern of four or five rings, which fill out the centre of the web, and make it strong for her other work. The real business has yet to come. She now goes to the outer portion of the web, and, spinning all the time, works round and round, leaving a line of silk all the way, gradually drawing nearer and nearer the centre. This is the part which has to catch the flies. The part first done in the centre does not matter now. The spider may even take it to pieces and eat the silk, for it to be formed again in her body into fresh material for silk.

When the web is finished, the spider may need her own nest. She may decide not to remain in sight upon the web, lest insects seeing her should flee.

THE FIERCE POUNCE OF THE SPIDER THAT MEANS DEATH TO THE FLY

Generally speaking, the garden spider does run the risk, but others do not. These others make a little nest of silk hidden away — a hiding-place nest which generally has two openings, top and bottom. Threads lead from the web to this nest, and the moment any insect touches the web these threads vibrate and warn the spider that a stranger has entered. She does not ask him to walk into her parlour. She springs out of hiding, rushes along the web with her clawed feet, pounces upon the insect, poisons it with one swift thrust of her weapon, then feasts upon its blood.

But suppose there should be more than one fly in the web at a time? The spider does not waste food. This is what a very big one in a garden did when a bluebottle-fly entered her nest while she was feeding upon another fly. With a buzz and a kicking and fluttering the bluebottle announced his arrival. He could not escape, for the net was too sticky. But there was just a chance that he would do some damage. The spider ran no risks. She uncoiled her legs from the fly upon which she was dining, and rushed like a flash across the web to the bluebottle. She grappled with him, and, with one movement, made it impossible for him to get away. She did not kill him, but seemed to stupefy him. For a few seconds she was busy with her claws round him, then suddenly the big bluebottle began to spin round and round on a thread of silk, her claws making him spin. And, lo, in a twinkling, he was completely wrapped in a sheet of silk.

THE MYRIADS OF PESTS THAT THE SPIDERS DEVOUR

She had spun a cocoon all over him, and she now hung him up in this cocoon in the web, and went calmly back to her first meal, leaving him until she was ready to eat him at her leisure. It is of no use pretending that we love spiders, because we do not. We all shudder at their work, but at the same time we know that they are among the greatest friends we have in destroying, every summer, myriads of flies and harmful insects which, if left to multiply, might make our lives almost unbearable.

Leaving out of account the seeming cruelty of the spider's life, which, after all, is no worse than that of the beautiful birds which live, as she lives, upon insects, we can all admire the wonder of her building. That nest of hers is so strong that the wind will not blow it down, and heavy dew will glisten in its meshes without breaking a thread. The strength of each strand of silk in the web is wonderful, but the strength of the whole, thanks to the beautiful way in which it is made, can scarcely be believed. A scientist has tried to make it plain in this way.

Let us suppose, he says, that a child can lift a six-pound weight one foot high with 350 rubber bands, each band capable, when stretched, of pulling six pounds a distance of one foot. Let these bands be fastened to a wooden platform, on which stand two horses, weighing 2,100 pounds, or nearly a ton.

THE MARVELLOUS STRENGTH OF THE SPIDER'S TINY SILK THREADS

If, now, the child will set to work and stretch these rubber bands one by one, hooking each one up as it is stretched, in less than twenty minutes that child will have raised the pair of horses a distance of one foot. The elasticity of the rubber bands enables the child to divide the weight of the horses into 350 parts of six pounds each, and,

SPIDERS AND SCORPIONS WITH THEIR PREY

These remarkable photographs show three stages in the stalking of a fly by a marpessa spider, one of the largest of the northern jumping spiders, whose favourite haunt is the wooden palings of our gardens. The marpessa has keen sight, and is so cunning in hunting its prey that it hides behind every projection as it moves slowly towards its victim. At last, when it has come near enough, it gives one rapid jump, and the fly is caught.

The formidable bird-eating spider of South America is as large as a mouse, and its furred feet enable it to walk up glass. Its principal food is beetles.

The wolf-spiders of our gardens are hunters, not trappers, and their movements are very rapid. When pressed by an enemy, they leap away.

The tarantula of South Europe is a large spider that digs a burrow, where it hides for its prey. In winter it covers the opening with silk.

These are scorpions, and the one on the right has just seized a cockroach and instantaneously killed it with one sting of its formidable tail. It is now in a warlike attitude, ready to fight the other scorpion in defence of its meal.

Here is another of the dreaded tarantulas. The ignorant peasants of Italy believe that its poisonous bite causes madness, which brings on a dancing frenzy.

The largest and most dangerous scorpions, like the buthus, shown here, are found in tropical Africa and in India. They are sometimes nine inches long.

The water scorpion of our ponds is a creature that masquerades as a scorpion, but is not really a scorpion at all. Its tail is not a sting but only a breathing tube.

Another of these false scorpions is the chelifer, shown here. It is often found in old bee-hives, hen-roosts, and pigeon-houses, and under the bark of some trees.

by lifting all these separate pieces one foot at a time, the child can in the end easily raise this great weight. Each thread of the spider's web acts exactly like one of the rubber bands.

The garden spider makes her web in order that she may remain in comfort at home; but she has tiny relatives who use their silk for travelling. They send out their threads of silk as the garden spider sends out hers, but instead of waiting for the web to catch hold of some support, they float away on the little magic carpet of their own making. The wind catches up the light strands of silk, and away they go up into the air, with the spider comfortably swinging at the end. In this way the spiders often travel great distances, for they have been met far out at sea. Many of the webs, becoming drenched with moisture, descend upon trees and hedges; some are blown across paths, and, wet and heavy, catch our faces as we walk. On bright autumn mornings, as we motor along the country roads, the face of the driver and the front of the car catch scores of these webs. It is to be feared that the people in the car think only what a nuisance these little webs are, and never pause to reflect upon the wonder of them.

A SPIDER THAT DIGS A HOLE AND COVERS IT WITH A LID

The feats of our garden spider, wonderful as they are, seem commonplace when contrasted with the work of the trap-door spider. This creature is more common in hot countries than in others, but it exists in America, though it is not represented here by the largest species. By some naturalists it is called the mason spider, but its more common name is that which we give it here.

It makes a circular shaft in the earth about a foot deep, and from half an inch to one and a half inches wide. This shaft it first coats with a glazing material which makes it water-tight, and prevents particles of earth from falling in. Next, it lines the whole shaft with a covering of silk-like paper. Some of the tunnels have two tubes. The first tube descends in a straight line, and the second tube is made to branch off at a tangent, and to ascend, so that the two tubes are forked like a catapult. The door at the entrance to the shaft is, however, the greatest masterpiece of this spider's work. It is formed of layers of silk and earth, and exactly resembles its surroundings. The spider is so skilful in practising this deceit that it even glues pieces of earth and bits of dead leaves to the upper side of the door, so that it is quite impossible when the door is closed to discover it.

THE WONDERFUL DOOR OF THE SPIDER'S UNDERGROUND HOME

The hinge of the door is composed of strong silk, so that the trap can be pushed open quite easily from below. Should an enemy by some means find the trap-door, as it may by pursuing the spider to its home, the occupant, darting into the hole, pulls the door to with its claws and holds it tightly in position. It must be not uncommon for this to happen in some parts of the world, for there are spiders that are not content with one door; they have one door at the top of their shaft, and another, a smaller one, some few inches lower down.

The trap-door spider lives at the bottom of the tube. It must have very acute hearing, for it can detect the footfall of the lightest insect. Fancy our hearing an ant walking along the ground! The spider does, and out of its cell it dashes, seizes the insect, and drags it down into the shaft, where it sucks the juices which its body contains, then brings up the carcase and throws it well away from its home. Should any damage be done to its dwelling, the spider at once repairs it. By watching the spiders come out at night, naturalists have been able to discover these homes, and, to test the power of the spider, have removed the trap-door. It is proved that the spider can repair the damage five times, but no more. After the fifth destruction of its door, the spider gives up the struggle and goes away and hides, doubtless to await the time when it shall have accumulated a store of silk with which to renew work.

GREAT SPIDERS THAT CATCH BIRDS AND MICE IN THEIR WEBS

The strength of the webs woven by some of the tropical spiders far exceeds that of the webs which we know in this country. In the web of one, a mouse was caught. The spider increased its web, and actually succeeded, by adding new strands of considerable length, in raising the mouse four inches—in the

same way, we may take it, that the child would raise the horses by means of elastic bands. We need not be surprised, therefore, that the webs of spiders like these are strong enough to catch birds. We must not, however, regard these as the real bird-catching spiders. That spider does not set snares to catch its prey. It makes a web, it is true, but this is in clefts of trees or between rocks, and here it hides all the day.

SPIDERS AS BIG AS RATS THAT CHILDREN LEAD ABOUT AS PETS

At night it comes forth, a fearful-looking monster, nearly as big as a rat. When its legs are outspread it occupies a surface nearly a foot in diameter. It can climb anywhere, for its feet are so padded with silk that it can easily run up a sheet of smooth glass set in an upright position. Its food consists for the most part of beetles and other insects, but it will eat any living thing which it can overpower. Thus it happens that when it finds a bird, the spider pounces on it, pins it down, and sucks its blood. This is the biggest of the spiders, and one of the most famous.

The strange thing is that children keep these spiders as pets. They tie a thread round what we may call the waist of the spider, so that it cannot get away, and lead it about as we in this country lead little dogs.

A very famous and dreadful spider is the tarantula, which was for a long time supposed to cause people the most extraordinary illness called "tarantism." Old-time doctors made a careful study of the matter, and decided that nothing but music could cure the sufferers; and books still exist advocating this mode of treatment, and actually giving the names of the pieces of music to be played for the relief of the victim. The tarantula really does give a bad bite, but the idea of its causing dancing madness, as the supposed ailment was called, is all nonsense.

THE WOLF-SPIDER THAT WILL LAY DOWN HER LIFE FOR HER CHILDREN

The tarantula is only a big wolf-spider, and wolf-spiders of various sorts and sizes are common in parts of the United States; as, for example, in Southern California. They are the spiders which race about in the summer among stones and grass. They do not spin webs to catch their prey, but depend upon the speed with which they can run. The mother wolf-spider may often be seen carrying with her the little packet in which her eggs are deposited. She is a brave and good mother, and will fight to the death to protect her little ones and her eggs. When the little spiders are born, she carries them about on her back, the babies fastening themselves on with strands of silk until they are big enough to run about and look after themselves.

The wolf-spider can get over the ground at a great rate, but not so rapidly as the hunting spiders which we may find in our gardens on a hot day. For the hunters not only run, but make great leaps, and so catch the fly or other insect that they desire to have. It is quite exciting to see them spring down a high wall, for it would seem as though, having no wings, they must fall headlong to the bottom. But they know better than that; they attach themselves to the starting point by a silken rope which runs out as long as they wish to descend, but stops when they reach the object for which they aimed. Then they can climb back by the aid of the rope, bearing their prey with them.

THE MARVELLOUS BALLOON OF A SPIDER AT THE BOTTOM OF A POND

One of the most interesting spiders may be seen in any quiet pond or ditch. The water-spider is, indeed, one of the marvels of the animal world. It is a creature which must breathe the air of the atmosphere to live, yet it is born under water, and passes all its days in or upon the water. It can run as easily and lightly upon the water as an ordinary creature can run on the land. Suddenly it dives into the water, and we see it darting down glistening with bubbles. And those bubbles explain the whole mystery. The water-spider is thickly covered with hairs and little bristles, and when it dives into the water, these carry air down with them, so that the skin of the spider is never wet.

But the most important thing is a big bubble of air which the female spider somehow manages to carry down secured between her hind legs. When she first goes down into the water she spins under the water a little dome-shaped cell of silk, with its opening downwards. Having made this, she ascends to the top of the water,

charges her whole body with air, and so arranges her hind legs that the big bubble of air cannot escape. This air she discharges into the nest which she has previously made. She makes several journeys up to the top of the pond, and each time descends and acts as before, until the air fills the cell and forces out the water. Thus she has a little palace of silk and air in the water secure from all her enemies. Here she makes her home and lays her eggs.

A SPIDER THAT BUILDS A RAFT AND PUTS HER EGGS IN A BAG

Another happy spider is the raft-spider. This one makes the neatest little raft of leaves, and on it floats about on the surface of the lake where she makes her home. If she sees a fly afar off, she darts from her raft and runs, light as air, upon the water. Should there be food down below, she trips nimbly down the stem of a plant growing in the water, and so reaches her meal. When she has laid her eggs she makes them up in a neat little silken bundle and carries this about with her. When the time draws near for the eggs to hatch, however, she fastens the cocoon to some plant growing near the edge of the water.

There are many more spiders in the world which afford interesting study. Some are fearful things, which can change the colour of their eyes at will, as the chameleon can change the colour of its skin. Some run sideways like a crab ; some build nests on coral, which keep out the water when the tide rises ; and these spiders live on fish. There are spiders pretty well everywhere. Their very existence is a sure evidence of a great number of insects, and that is a good answer to the question as to what purpose they serve in life.

THE MITES THAT ARE FOUND ON ANIMALS AND MITES THAT WE FIND IN CHEESE

In the same class as the spiders are the mites and ticks, tiny things that live, for the most part, as parasites upon other little animals. Some infest birds, some make the lives of sheep miserable, some are small enough to live upon the bodies of beetles and harvest-spiders. We need note only one, however, and that is the cheese-mite, which, however, as we shall soon see, is not a true mite at all. How do mites get into fine old Stilton, Gorgonzola, or other cheese ? We know that the cheese in the making has undergone such a process that no living thing should be in it. Further, we know that life does not begin of itself anywhere. How, then, come the mites in our cheese at table ? The explanation may surprise some people who think that a cheese is not prime and rich unless it has mites.

The mites are hatched from eggs laid by a nasty little fly which is related to the house-fly. The fly gets into the larder, or into the cheese-store, and selects a cheese which is cracked or broken upon the outside. In this crack it lays its eggs. These, when hatched, produce tiny maggots which we call mites, or hoppers, which in course of time will, if not destroyed, turn into flies. Hence the presence of mites in cheese is no testimony to the good quality of the cheese, but rather indicates that the cheese has not been as carefully treated as should have been the case—not kept as clean and safe from insects as clean people should have their food.

THE SAVAGE SCORPION'S STING THAT WILL MAKE A MAN ILL

In concluding, we turn from the smallest to the largest of the class to which this story is devoted, and we come at last to the scorpion. It is a hungry, savage creature, and serves a purpose by consuming an enormous number of harmful insects. The rest of its character is bad. Seemingly, the scorpion was a poisonous, bad-tempered creature when it was created ; and its manners, like its form, have remained unchanged. The worst scorpions live in the hottest parts of Africa and in India. These reach a length of eight or nine inches, and their sting is so bad as to make even strong men very ill indeed. The scorpion's body is half tail. That tail, as it swiftly moves along, it carries in the air, raised over its back. When it grasps anything, down comes the tail, and from the end a sting protrudes, and a horrid poison is squirted into the wound which the sting causes. The poison serves to paralyse the insect seized by the enemy.

Scorpions may be very well as a check upon insects, but they get into beds and boots and other places where they should not be ; and when the owner arrives they sting him without mercy.

The next stories of Nature are on page 3407.

HANSEL AND GRETHEL

CONTINUED FROM 3212

ONCE upon a time, near the borders of a dense forest, there dwelt a poor man who earned his living by cutting wood.

On his way home through the wood, one day, he found a poor little girl who had been carried away by a vulture, and left high up on the branch of a tree to die. He took the little girl home to his wife, and they called her Grethel, and brought her up with their only son, Hansel. But his wife died, and the wood-cutter married again. After a little while the wood-cutter became very poor indeed, and could hardly earn enough money to buy bread.

One night as they were lying awake, weak and restless from hunger, Hansel and Grethel heard their stepmother say to their father:

"In a few days we shall all die of hunger. If we had only ourselves to keep we might manage to live. I know what we must do. Early tomorrow morning we will take the children far into the forest and leave them there."

"No, wife," said the man. "How can I have the heart to leave my children all alone in the forest for the wild beasts to kill and devour?"

But the hard-hearted woman talked and talked until the poor man agreed.

Hearing this dreadful plan, Grethel wept bitterly. But Hansel, who deeply loved her, comforted her. "Do not cry, dear Grethel," said he; "I will find a way to get home safely."

He then got up quietly, crept out of the house, and filled his pockets with little white pebbles.

At sunrise their stepmother wakened Hansel and Grethel, saying, "Get up, children, for we are going into the forest to gather wood," and she gave them two slices of bread for their dinner. Grethel carried both pieces in her apron, as Hansel's pockets were full of pebbles.

As they went along, Hansel kept looking back, until at last his stepmother asked him sharply why he kept lingering and looking behind.

"I can see my little white cat sitting on the roof, and I am sure she is crying for me," said Hansel.

"You stupid!" she replied. "It is only the sun shining on the chimney-pot."

When they reached the middle of the wood their stepmother said:

"Run about and collect some twigs, and we will make a bonfire to keep us warm."

And Hansel and Grethel soon had a blazing bonfire of brushwood. Tired with their long walk, they fell asleep; but when they woke up it was dark, and they were quite alone. Grethel began to cry bitterly; but Hansel said:

"We shall be able to find our way home all right when the moon rises,

because I dropped a white pebble every time I looked behind this morning."

When they reached home they were scolded by their stepmother for straying away; but their father was ever so pleased to see them come back safely.

Not long afterwards, however, the same poverty came upon them, and the stepmother persuaded her husband to take the children much farther into the wood. The children again overheard the cruel scheme; but Hansel was unable to get a pocketful of stones because his mother had locked the door. He bravely lingered behind, however, and dropped crumbs from his piece of bread all the way along.

"Why do you lag behind so, Hansel?" said the woman.

"I am looking at my little dove sitting on the roof wanting to say good-bye to me," replied Hansel.

"You silly boy!" said she. "It is only the morning sun shining on the housetop."

Their mother left them asleep just as before, and when Grethel said, "What are we to do, Hansel, dear, for the night is coming on and we are much farther in the forest than we were last?" Hansel replied, "Do not fear, dear Grethel; I have left all my bread in little crumbs on the wayside."

Grethel then dried her eyes and shared her piece of bread with Hansel. When the moon rose they started off; but, to their alarm, they found that there were no crumbs to be seen, as the birds had eaten them all up. They wandered about the forest all through the night and the next day, having only berries to eat; but they could not find their way home, so they laid themselves down and went to sleep.

About noon the next day they saw a lovely snow-white bird sitting on a branch, and singing so beautifully that they listened to it for a long while. When it had finished singing it flew slowly away, looking round at them as if inviting the children to follow. This Hansel and Grethel did, and after a little while the bird perched on the roof of a tiny house.

To their surprise they found that the walls of this little house were made of gingerbread, the roof of cake, and the windows of barley sugar.

"Oh! Something to eat at last!" cried the hungry Hansel. "Here is a lovely piece of barley sugar for you, Grethel." And the two children pulled pieces of gingerbread off the walls, and ate to their heart's content. Suddenly a voice came from within:

"Munching, crunching, munching,
Who is eating up my house?"

And the children answered:

"The wind, the wind,
'Tis only the wind!"

and went on eating hungrily.

In a minute or two the door opened, and a little old woman hobbled out.

"Poor little children," said she. "How tired and hungry you look! Come in with me, and I will give you plenty to eat and drink."

The children followed her in, and had a meal of milk and pancakes, and apples and nuts. And then she put them into two pretty little beds, and they fell asleep and dreamt they were in heaven.

Now, the old woman was really a witch, who built this gingerbread house to attract children, so that she could capture them and eat them. So when Hansel was asleep she took hold of him and quickly shut him up in an iron cage. She then shook Grethel, and said:

"Get up, lazy bones, and help me get water and cook some food, for I am going to fatten your brother and eat him."

After breakfast the old woman went out. Grethel immediately ran and told Hansel all the old woman had said.

"The old woman must be a bad fairy," said Hansel. "Search for her magic wand and pipe, and then help me out of this cage."

So Grethel found the wand and pipe, and they ran away together. After some time the old fairy came back, and was very angry to find that Hansel and Grethel had escaped her. So she put on her seven-leagued boots, and quickly caught up the children.

As soon as she saw the bad fairy, however, Grethel waved the magic wand, changed herself into a lake, and Hansel into a swan floating on it.

The fairy tried hard to entice the swan to the shore by offering him crumbs of bread and cake, but he would not move, so she gave it up and went home in disgust for the night. Grethel then changed Hansel and herself back into their proper forms, and

THE WITCH OF THE GINGERBREAD HOUSE

When Hansel and Grethel were lost in the forest they came upon a wonderful house made of gingerbread, with a roof of cake and windows of barley sugar. They were so hungry that they immediately broke off a piece of barley sugar and began to eat it. Suddenly, to their amazement, an old witch appeared and invited them in.

on they went. Next day they perceived the fairy overtaking them again. This time Grethel changed herself into a rose in a prickly hedge, and Hansel sat on a mossy bank beside it and waited.

The fairy soon came up and mounted the bank to pick the rose which she knew must be Grethel. Hansel quickly put the pipe to his mouth and began to play. Now, as it was a fairy pipe, everyone who heard its music had to dance, even the old fairy, and there she capered and jigged, getting fixed firmly into the hedge, where the sharp thorns tore her clothes off and pricked her skin.

Grethel freed herself once more and they went on again, but became very weary, so Grethel decided to turn herself into a daisy while Hansel tried to find the way home alone. But Hansel got lost and did not return.

One day a shepherd spied the daisy, and picked it, saying: "I will take this little flower home with me; it is the prettiest daisy I have ever seen."

So he took it home and placed it in a box, and from that day everything flourished wonderfully in his house. All the work was done, the fire made and the water fetched, before he got up. He could not make this out, so he went to a wise woman, and she said:

"It must be witchcraft. Get up early to-morrow morning and throw a white cloth over anything that moves."

So he got up early and saw the box open and the daisy come out. He at once threw a white cloth over it, and the beautiful Grethel stood before him. She told him her troubles, and said:

"I will stay with you until Hansel comes back."

A long while passed and Hansel came back. Hansel and Grethel once more started for home, but getting tired they went to sleep in an old hollow tree.

In the morning when they awoke, the sun had risen high above the trees, and it was very hot. Little Hansel said:

"Sister, I am very thirsty; if I could find a brook I would go and drink, and fetch you some water too. Listen! I think I hear the sound of one."

Then Hansel rose up and took Grethel by the hand and went in search of the brook. But the fairy had found out all that had happened, and intended to do them harm; and when they had found a brook that ran sparkling over the pebbles, Hansel wanted to drink; but Grethel thought she heard the brook, as it babbled along, say: "Whoever drinks here will be turned into a tiger." Then she cried out:

"Ah, brother, do not drink, or you will be turned into a wild beast and tear me to pieces!"

"I will wait," said Hansel, "for the next brook."

But when they came to the next, Grethel listened again, and thought she heard: "Whoever drinks here will become a wolf." Then she cried:

"Brother, brother, do not drink, or you will become a wolf and eat me!"

So he did not drink, but said:

"I will wait for the next brook; there I must drink, say what you will, for I am so thirsty."

As they came to the third brook, Grethel listened, and heard: "Whoever drinks here will become a fawn."

"Ah, brother," said she, "do not drink, or you will be turned into a fawn and run away from me!"

But Hansel had already stooped down upon his knees, and the moment he put his lips into the water he was turned into a fawn.

Grethel wept bitterly over the poor creature, and the tears, too, rolled down his eyes as he laid himself beside her. Then she said:

"Rest in peace, dear fawn; I will never leave you."

So she took off her golden necklace, and put it round his neck, and plucked some rushes and plaited them into a soft string to fasten it, and led the poor little thing by her side farther into the wood.

After they had travelled a long way, they came at last to a little cottage; and Grethel, having looked in and seen that it was quite empty, thought to herself, "We can stay and live here." Then she went and gathered leaves and moss to make a soft bed for the fawn, and every morning she went out and plucked nuts, roots, and berries for herself, and sweet shrubs and tender grass for her companion; and it ate out of her hand, and was pleased, and played and frisked about her. In the evening, when Grethel was tired and had said her prayers, she laid her head upon the fawn for a pillow, and slept. They lived thus a long while in the

wood by themselves, till it chanced that the king of that country came to hold a great hunt there. And when the fawn heard all around the echoing of the horns, and the baying of the dogs, and the merry shouts of the huntsmen, he wished very much to go to see what was going on.

"Ah, sister," said he, "let me go out into the wood. I can stay no longer!"

And he begged so long that at last she agreed to let him go.

"But," said she, "be sure to come to me in the evening. I shall shut up the door to keep out those wild huntsmen; and if you tap at it, and say, 'Sister, let me in,' I shall know you; but if you don't speak, I shall keep the door fast."

THEY WENT TO SLEEP IN AN OLD HOLLOW TREE

Then away sprang the fawn, and frisked and bounded along in the open air. The king and his huntsmen saw the beautiful creature, and followed, but could not overtake him; for when they thought they were sure of their prize, he sprang over the bushes, and was out of sight in a moment.

As it grew dark he came running home to the hut, and tapped, and said: "Sister, sister, let me in." Then she opened the little door, and in he jumped, and slept soundly all night on his soft bed.

Next morning the hunt began again; and when he heard the huntsmen's horns, he said:

"Sister, open the door for me, I must go again."

Then she let him out, and said:

"Come back in the evening, and remember what you are to say."

When the king and the huntsmen saw the fawn with the golden collar again, they gave him chase; but he was too quick for them.

The chase lasted the whole day; but at last the huntsmen nearly surrounded him, and one of them wounded him in the foot, so that he became sadly lame and could hardly crawl home. The man who had wounded him followed close behind, and hid himself, and heard the little fawn say: "Sister, sister, let me in." Upon which the door opened, and soon shut again. The huntsman marked all well, and went to the king and told him what he had seen and heard; then the king said:

"To-morrow we will have another chase."

Grethel was very much frightened when she saw that her dear little fawn was wounded; but she washed the blood away and put some healing herbs on it, and said:

"Now go to bed, dear fawn, and you will soon be well again."

The wound was so small that in the morning there was nothing to be seen of it, and when the horn blew, the little creature said:

"I can't stay here; I must go to look on. I will take care that none of them shall catch me."

But Grethel said: "I am sure they will kill you this time; I will not let you go."

"I shall die," answered he, "if you keep me here. When I hear the horns, I feel as if I could fly."

Then Grethel was forced to let him go; so she opened the door with a heavy heart, and he bounded out gaily into the wood.

When the king saw him, he said to his huntsman:

"Now chase him all day long till you catch him; but let none of you do him any harm."

The sun set, however, without their being able to overtake him, and the king called away the huntsmen, and said to the one who had watched the fawn:

"Now come and show me the hut."
So they tapped the door, and said:
"Sister, sister, let me in."

Then the door opened, and the king went in, and there stood a maiden more lovely than any he had ever seen. Grethel was frightened to see that it was not her fawn but a king with a golden crown. However, he spoke kindly, and took her hand, and said:

"Will you come with me to my castle and be my wife?"

"Yes," said the maiden. "But if I come my fawn must go with me."

"Well," said the king, "he shall come and live with you, and want for nothing."

Just at that moment in sprang the little fawn, and his sister tied the string to his neck, and they left the hut.

Then the king took Grethel to his palace, and celebrated the marriage in great state. And she told the king all her story; and he sent for the fairy and punished her. And the fawn was changed into Hansel again, and he and his sister loved one another, and lived happily together all their days.

THE FABLES OF ÆSOP THE SLAVE

THE VILLAGER AND THE VIPER

ONE cold winter's day a villager found a viper under a hedge almost dead with cold. The man had pity on the poor creature, and so he brought it home and placed it on the rug in front of a warm fire. After it had been there some time the warmth revived it, and it at once began to hiss and to threaten to bite the children.

The villager heard his children crying out, and running in he caught up a stick and killed the viper, saying, "Is this the way you reward those who try to save your life?"

People who are not grateful for kindnesses are unlikely to receive any more.

THE FOX AND THE GOAT

A FOX one day happened to fall into a well, and could not get out again. Some hours afterwards a goat came to the place, and, wanting to drink, asked the fox if the water was good.

"It is so very good and sweet," said the fox, "that I have drunk so much that I am afraid I shall be ill."

Upon this the goat, without any more hesitation, jumped into the well to drink the water. The fox at once sprang on her back, and so was able to leap out, leaving the poor goat in the well to get out as she could.

Be careful how you take the advice of people whom you do not know.

THE BOY WHO CRIED "WOLF!"

THERE was once a shepherd's boy who minded a flock of sheep in the fields. As a mere joke he would often shout out: "Wolf! Wolf!" This caused the men working in the neighbouring fields to run to the rescue, but after being thus deceived two or three times, they decided to take no notice of his shouts.

Soon afterwards a wolf really came, and the shepherd's boy cried out in earnest. But no one took any notice of his shouts, and so his sheep were killed by the wolf.

If we tell untruths, no one will believe us, even when we speak the truth.

JUPITER AND THE ASS

AN ass which belonged to a gardener, and was tired of carrying a load of cabbages to market every day, prayed to the god Jupiter to give him a new master. Jupiter agreed to, and gave him a tilemaker, who sent him every day to market with a heavy load of tiles.

The poor donkey found that his work was harder than ever, so he again asked the god to give him a change. This time Jupiter gave him to a tanner, who treated him more hardly and cruelly than either of his former masters.

When it was too late the ass wished that he had stayed with his first master.

Be contented with your lot.

THE FOX AND THE LION

THE first time that a fox saw a lion and heard his terrible roar he was so frightened that he lay trembling on the ground and almost died with fear.

The next time he met the king of beasts he was not so frightened, but ventured to look timidly at him. The third time that the two animals met the fox had lost all his fear, and came coolly up to the lion and entered into conversation with him as if he had been an old friend.

Familiarity breeds contempt.

THE PASSING OF KING ARTHUR
AND THE BREAK-UP OF THE TABLE ROUND

MANY other stories of King Arthur's knights are there, and these you may read in books; but here we have room left only to tell the end of the Round Table. For this gracious Order of Chivalry, which was like a parliament ruling Britain in a goodly manner, so that no man dare play the tyrant and none oppress the poor and the weak, came to an end, and the unwitting cause of it was Queen Guinevere, the loveliest lady in Christendom.

For this beautiful lady could not keep her thoughts from dwelling much on Sir Lancelot of the Lake, who was the handsomest, the strongest, and the most courteous of all King Arthur's knights, and Arthur loved him as a brother. And so great was Arthur's love that when evil men, who hated Lancelot, tried to make him think that Guinevere loved the knight more than the king, Arthur was very wroth. But these evil men bided their hour, and one day, when Lancelot was alone with the queen, they came in a great number and made an uproar at the door of the queen's chamber, crying "Treason! Treason!" So Lancelot, after slaying many of them, had to flee, and Guinevere—against the king's will—was tried for treason, and was ordered to be burned as a traitor to the king.

But as she stood bound to the stake, and the flames began to rise around her, Lancelot rode up, slew those about her and before her, and carried her off. He had saved her, but she could not be his, for Lancelot loved honour. So he took her to an abbey, where she gave up all her life to prayer and holiness, and there the greatest knight of Christendom parted from the lovely queen. After that Lancelot retired to Gaul.

QUEEN GUINEVERE IN THE ABBEY GARDEN AT MALMESBURY

This picture is reproduced by permission of the artist, Mrs. Mary F. Raphael, who also painted the beautiful picture given on page 686.

Then the brother of one whom Lancelot had slain forced the heart-broken Arthur against his will to make war on Lancelot. And they fought in Gaul, and Lancelot gave orders that none should hurt the king, and as often as he saw Arthur dismounted he himself went to his rescue. Many times in the midst of this fierce battle the two great men looked into each other's eyes, and exchanged words of love and courtesy.

Afterwards Arthur returned to Britain, for his kingdom was in an evil state, and there was a great war in the West. The story of Lancelot and the queen had been a poison in the land,

and men forgot honour and courtesy, and had become like beasts. It seemed as if all the king's noble work was undone. The ideals of kindness and chivalry which had given peace, glory, and virtue to the land, were now mocked at as make-believes and foolish notions. The strong trampled the weak. Few cared about honour. There was none to help the weak and oppressed. Sad and heart-broken was King Arthur, who had lost his queen, his favourite knight, and now his kingdom; but he fought in the West boldly for Christ and righteousness, as one who would never surrender; and there was he wounded to the death.

Now, when he was wounded, he called upon Sir Bedivere to carry him to a little church by the seashore; and Sir Bedivere wept, but Arthur comforted him. Then said the king:

"Take now my sword, Excalibur, and hasten thee to the side of the water, and fling it into the deep." And Sir Bedivere went away. But the beauty and fame of the sword tempted him, so that he hid it, and returned to the king with a lie. But the king knew that he lied, and sent him a second time. Yet a second time did Sir Bedivere lie, and the king sent him a third time. Then Sir Bedivere returned, and the king asked:

"What sawest thou?"

"I saw," answered Sir Bedivere, "a hand rise from the water, and as the sword hurtled towards the waves the hand caught it by the hilt, and brandished it thrice in the air, and afterwards drew it down under the water."

"It is well," said the king.

Then he commanded Bedivere to carry him to the water's edge, "Where the lapping waves floated many an empty helmet and the fitful moonlight fell on the upturned faces of the dead."

And as they reached the shore a great barge came to them, wherein were three queens, all in black with crowns upon their heads. And the queens received the king into the barge, and one took his head upon her lap, and another chafed his hands, and the third bowed at his feet, while the barge drew slowly away across the darkening sea.

And the last words of King Arthur came across the waters to Sir Bedivere, as he was kneeling on the shore: "Pray for me."

LADY AGNES OF ST. DUNSTAN'S TOWER

MUCHELNEY is a pretty little village of old-fashioned houses and apple orchards, lying amid the ruins of an abbey, in the marshlands of Somerset.

In the fifteenth century, one of the village lads fell in love with Lady Agnes, of St. Dunstan's Tower, and the two lovers stole away to a priest and were married.

But just as they were leaving the church, Lady Agnes's brothers arrived. Some of them seized the bride and carried her away, and the others attacked the bridegroom; and, thinking they had killed him, they took him into the Muchelney Abbey to die. But he recovered, and after vainly seeking about England for his wife, he returned to Muchelney Abbey, and became a monk, and soon rose to the position of abbot.

One evening, a woman, veiled like a nun, came to Muchelney and asked to see him. She was led into the abbot's chambers, and when they were alone she unveiled her face. He was surprised to see that she was Lady Agnes! At first the abbot did not know what to do. He was afraid lest the brothers of Lady Agnes should miss her and track her to the abbey, and once more carry her away from him. Now that she had found her way back to him, he vowed that nothing in this world but death should ever again separate them.

The abbot at once hid her in a secret recess in his chamber, and asked her to wait there until he had got everything ready for them to fly away together to some place where their story would not be known. He collected some money and saddled a pair of horses, and then opened the recess, saying: "Dearest, we can now depart."

But there was no answer. Opening the door of the recess, he gave a loud cry. His wife was lying on the floor, dead. And twining his arms about her body, he, too, died. The abbot's house, where all this happened, is still standing to-day, but it is now used as an ordinary farmhouse.

LEGENDS OF THE STARS

In the early ages shepherds tending their sheep and goats, huntsmen pursuing the hare, the bear, the wolf, and the lion, sailors on the wide sea meeting whales and sea monsters, or seeking fish, fancied that they could make out pictures in the groups of stars. They invented stories about them and about wonderfully strong and beautiful beings, gods and goddesses, who were more than human, living high up there in the sky. Here are a few of these legends telling of the star-pictures beginning on page 2611.

AN INDIAN LEGEND

ACCORDING to an Indian legend from California, the sun, moon, and stars are one big family. The sun is the great chief and ruler of the heavens; the moon is his wife, and the stars are his children, whom he has to eat to keep himself alive when he can catch them. But when he is up in the morning, they flee out of his sight as fast as they can, and dare not appear again until he goes into his hole in the west. He crawls along this hole till he comes to his narrow bed in the middle of the earth. This is so small that it does not give him room to turn round; so when he wakes up next day he has to creep out to the east. Then his wife, the moon, takes her rest.

Every month she grieves when he eats up some of the stars, and puts black over her gentle face to show her sorrow. This gradually wears off, till by the end of the month her face is bright again. The stars are happy with their mother, the moon, and sing and dance as she passes among them. After a time other star children disappear, and she has to put on mourning again for them.

ORION, THE BELTED GIANT

ORION was a giant who wanted to marry Hero, or Merope, daughter of Ænopion, King of Chios; but this king, who took a dislike to the suitor because of his great height, thinking to rid himself of a troublesome person, consented to the marriage only on condition that Orion freed the island of Chios from the beasts that raged there. This he did, but King Ænopion failed to keep his promise, and had him blinded. Then Orion was directed by a blacksmith, whom he carried on his back, to the best spot for facing the rising sun. Gazing at it, Orion recovered his sight.

According to one legend, Diana, through jealousy, slew him with her arrows; according to another, his death was due to the bite of a scorpion which rose from the ground to punish him for boasting of his prowess as a hunter. He was carried to the heavens, and there shines as a constellation of seventeen stars, with a glittering belt round his waist and his dog Sirius near him. He is found near the feet of the Bull, and is sometimes shown with a club or a sword in his hand, and bearing a shield. One of the stories about him is that he piled up a bank on the coast of Sicily to keep out the sea; another, that he was a worker in iron, and made a palace for Vulcan, underground.

THE GREAT DOG

NEAR Orion, between the Hare and the Milky Way, as far south as we in the Northern Hemisphere can see, lies the Great Dog of Orion, containing one very brilliant star called Sirius. It used to be regarded as a warning by the Egyptians, just as a good watch-dog warns a house of coming danger. The dog in the sky could not bark, but its bright light let the Egyptians know of any harmful event about to happen.

When they saw the star in the early morning they knew the Nile would soon overflow. So one name they gave it was the Nile star. Of course, they knew nothing of the real sources of the Nile then, because no one had found them out. Sometimes, to show what it was necessary to do on its appearance, they pictured the dog as a man with a dog's head, a stew-pot in his arms, a feather under one arm, wings to his feet, and leaving behind him a duck and a tortoise. The Greeks and Romans associated the Dog star with the heat of summer, and said that it burnt up the fields and killed the bees. We still talk of the dog days in the hottest season.

A FAMILY GROUP

THERE are four constellations in the sky standing for quite a family group. Cassiopeia, the mother; Cepheus, the father; Andromeda, the daughter; and Perseus, the son-in-law, with, a little further off, Pegasus, his winged horse. Cassiopeia foolishly declared herself to be more beautiful than the

Nereides, and the angry nymphs, in revenge, got Neptune to send a sea-monster to trouble Æthiopia, or Topa, where Cassiopeia lived, for she had married King Cepheus of that country. The story of Andromeda's exposure to the monster, and her rescue by Perseus is told elsewhere. Cepheus, the husband of Cassiopeia, sailed with the famous Argonauts.

Cassiopeia was pictured by the ancients in a southern constellation of thirteen stars, seated on her throne, and holding a palm-leaf in her hand. Cepheus is near here. Cassiopeia, as the constellation is called, can be recognised very easily in the sky in the form of an "m," or, as some see it better, a "w."

THE GREAT BEAR

LOOKING at this group of stars, so easily observed, for they never set in the Northern Hemisphere, people fancied they saw in them different objects. So the Greeks said: "It is a chariot"; the ancient Gauls called it "Arthur's Chariot"; the Americans, "The Dipper"; the English, "Charles's Wain" or "The Great Bear." There are two bears really, a Great Bear, or Ursa Major, and a Little Bear, or Ursa Minor. This is the legend of how they came there.

Jupiter and Calisto had a son named Arcas. Juno, who was jealous of Calisto, changed her into a bear, and her son by mischance was on the point of killing her. Jupiter, recognising her danger from huntsmen, changed her into a constellation. Arcas' kingdom was Arcadia, a happy land, where people were taught by their king to till the ground and spin wool. One day while hunting, he met a beautiful wood-nymph in trouble because the tree over which she watched was in danger from a river in flood. Arcas saved the tree by turning aside the current; then he married the nymph, and when he died left his kingdom to his three sons. Jupiter at his death turned him into a bear like his mother, so that he has since kept her company as a constellation.

THE PLEIADES

THESE seven stars were associated with seven beautiful sisters, daughters of Atlas, and named Electra, Maia, Alcyone, Taycete, Celæno, Merope and Sterope. They all married gods, except Merope, whose light is less bright because she was wedded to a mortal, Sisyphus, King of Corinth. Electra's light also diminished through grief after the fall of Troy, which her son Dardanus had founded.

The word Pleiades comes from a Greek word meaning "to sail," because this constellation shines well in spring, at a good time for sailors to start on a voyage. Because, too, of their association with Ver, the spring, these stars are also called the Virgiliæ. From the earliest times, festivals and seasons were connected with the rising of the Pleiades.

The story runs that, in Bœotia, the giant Orion went in pursuit of the seven sisters, but they prayed to be saved from him, and they were changed into the form of doves. Now they are ever at a safe distance from him in the skies, at the back of the Bull, and behind its protecting horns, where Orion cannot trouble them.

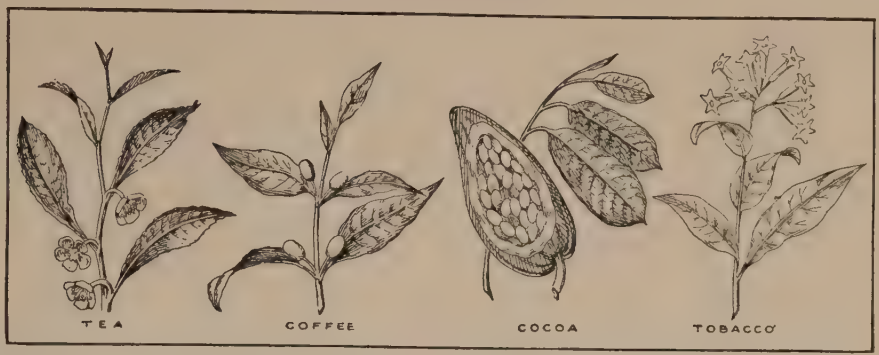
HERCULES WITH HIS CLUB

THE celebrated hero Hercules, son of Jupiter, was, of course, bound to be enthroned among the gods in the skies, so the Greeks gave him a place of honour, with his club in his right hand, an apple-branch in his left, in memory of the apples of the Hesperides, and in a kneeling position, with the lyre near his feet.

The legend is that Hercules was fighting one day with stones, but had used them all up. Then Jupiter, seeing the danger of his son, rained down a shower of round stones. These Hercules bent down to pick up, and throw at his enemies, and thus overcame them. This is why he is shown kneeling.

Many are the stories of his prowess and marvellous physical strength, but the most wonderful were his twelve labours, on the performance of which the Delphic oracle promised him immortality. These included slaying the Nemean lion, the Hydra, or water-snake, and the monster birds; capturing a stag with hoofs of bronze and antlers of gold, the boar of Erymanthus, the mad Cretan bull, the mares of Diomedes, Geryon's oxen, and Cerberus, the dog of hell; securing Hippolyte's girdle and the golden apples of the Hesperides. By his own will his body was burned on a pyre, and his spirit passed away in a cloud to Olympus, where he married the goddess Hebe, and became immortal.

THE NEXT STORIES ARE ON PAGE 3500



TEA, COFFEE, AND TOBACCO

CONTINUED FROM 3217

We must now discuss a number of substances which are very largely used, but which we cannot call foods because we do not find that they add any power to the body or make any of its tissues. If these things did nothing, they would not be worth mentioning; but though they are not foods, they have a very real action upon the body, and there are few people who do not take one or other of them every day. We ought to understand their action.

First we must just mention, and briefly dismiss, the things called condiments. Literally, this means *the things given with*; and the things that we give ourselves along with our food, and call condiments, are salt, pepper, mustard, vinegar, and so on. Of these, the first happens to be a condiment, as we say, because it has a very decided taste; but we have already learnt that it is an absolutely necessary food, without which we must die. But all the other condiments are quite different. They have no food-value of any kind; they may be actually injurious by irritating the coat of the stomach.

This is very rare, but it may happen when a person becomes, for instance, too fond of vinegar. We take these things not only for their own flavour, which we really do not care much about in itself, but because they act on the nerves of the mouth and tongue and nose so as to sharpen the taste and flavour of our food. If our appetite is poor, this is of service to us. Also, these things have a marked effect in persuading the stomach to produce its juices, and, if the stomach is not producing enough, that is also of good service to us. On the other hand, a great many people eat far more than is good for them, and the last thing on earth that they ought to add to their food is anything that tempts them to eat more.

No condiment of any kind, except, of course, salt, as we understand, is good for children. Children have good appetites and good digestions, and condiments should be saved up for the time when they have neither. That time is less likely to come at all if the healthy development of the organs of digestion has not been interfered with by adding unnatural things to the food. As we shall see, this remark about condiments, which is agreed upon by everybody who has studied the food of children, applies also practically to all the other things that have to be discussed in this part of our story.

All over the civilised world people drink enormous quantities of tea or coffee, or else of drinks made from other plants that really contain the same thing for the sake of which we take tea and coffee. Of course, tea and coffee have very different tastes, and that

difference must be due to something. Certain volatile oils occur in the tea-plant which are quite different from those in the coffee-plant. These oils have a very pleasant taste and flavour, but they are not very important in their action on the body. The thing that really gives tea and coffee their attraction is the same substance in both of them, and it exists in several other plants. It is sometimes called *theine*, and sometimes *caffeine*. This is a wonderful substance, and, so far as we know, there is nothing else like it in the world. It is the only true stimulant of the brain that has yet been discovered. Other things, such as alcohol, will appear to stimulate the brain, but that is only appearance, as we shall see. Caffeine, however, really makes the brain work better, it produces no reaction afterwards, and just because it is the only true stimulant of the brain, it is the only drug we know which, by its pure action on the brain, will keep people awake.

THE STIMULATING DRUG THAT HELPS THE STUDENT TO KEEP AWAKE AT NIGHT

Medical students working for examinations sometimes take not merely tea or coffee but pure caffeine itself, which is a bitter-tasting white powder; and swallow large doses of it at night in preparing for an examination. I do not say that this is a wise thing to do, but it will keep one awake, it will enable a man to read and work hard for hours when, without it, he could not possibly have kept his eyes open, and the only result that appears to follow after a long time is that the drug becomes rather less effective.

All this is not to say that we may not hurt ourselves with tea and coffee, because we often do. For one thing, people who are not working for an examination, and whose difficulty is not to keep awake, but to get to sleep, hurt themselves by taking these things. Bad sleepers ought either to make it a rule to take no tea or coffee after five o'clock, or after midday, or, better still, to go without altogether.

Then, again, many people hurt themselves with tea not because the caffeine does them any harm, but because the tea-leaf contains a great deal of a curious substance called tannic acid, or tannin, which is bad for the digestion. If we put a little pure tannin into the mouth, we can feel at once how it dries the mouth up, and it does the same in the case of the stomach. This means that the digestive juices cannot be properly produced. If we allow for the possible interference with sleep, and for the interference with digestion, we account for the whole of the bad effects that may follow the frequent taking of tea.

THE RIGHT AND THE WRONG WAYS OF MAKING TEA

China tea contains less tannin than other tea; but the really important thing is the way in which tea is made. Careful experiment has shown that in about three minutes boiling water will extract practically all the caffeine in the tea-leaf, together with plenty of flavouring matter. In this period of time very little tannin is extracted. If we go on infusing after this, we get nothing more that is pleasant or useful, but we do get far more tannin; more and more indeed gets into the water for as long as three-quarters of an hour, and there is far more after five minutes than after three. It is very wrong to boil or stew tea. It should be infused, which means that the boiling water should be poured upon it; and it should not be infused a moment longer than four minutes at the outside. The Chinese, to whom we really owe tea, say that the best water for making it with is that from a running stream, and the worst is well-water. The reason is that one should use water which has plenty of gases in it. If we allow the kettle to go on boiling, we drive off these gases, and make the water flat, and spoil the tea. We should use the water directly the kettle has come to the boil.

THE WAY TO GET THE BEST VALUE INTO A CUP OF TEA

If we have to use water which is flat to begin with, we should pour it from a height, from one jug to another, so that it can take up some of the gases from the air. If the water is hard, a pinch of baking-soda should be added to the teapot. Tea-tasters use a smaller proportion of tea than most of us do. The teapot should be thoroughly hot, for if the water falls much below the boiling point while the infusion is going on, some of the things in the leaves which give the tea its best flavour do not get into the water. We should never make a second brew, for it is

certain that the first brew takes away from the leaves everything worth having. Anyone who cares to attend to these rules about the making of tea will get a far more delicious drink from cheap tea than can be got from tea costing twice as much, but wrongly made.

Let us remember, too, that properly made tea is very nearly the most innocent drink in the world, and in many respects, and for most people, is actually beneficial. In our country we drink about four million gallons of tea every day, and the very small amount of ill-effect that can fairly be put down to this gigantic consumption is due to the fact that many people are so careless in the way they go about it.

So far as caffeine is concerned, coffee and tea do not differ very much—that is to say, coffee made with milk contains about a grain of caffeine to the cupful, and the rate in tea is about the same. But, of course, if we drink strong black coffee we swallow a good many grains of caffeine every day. There is a special and powerful volatile oil in coffee which upsets some people, so that they cannot drink coffee, though they can drink tea.

THE HARM THAT COMES OF BAD TEA AND BAD COFFEE

Our commonest mistake in making coffee is that we make it too weak. The berries should be freshly roasted, neither too much nor too little, and they should be ground just before they are used. The same rules apply to the water as in the case of tea. Metal apparatus, especially if it is complicated, is bad. It is often difficult to clean, and then the stale coffee spoils the new brew. If the coffee is allowed to stand for a little, there is no need to filter it. A simple earthenware vessel is the best. If anyone finds that he is not sleeping as he ought to do, and if he is a coffee-drinker, that is the very first thing that he should cut down.

Though black coffee is decidedly stronger than tea, it is very much less injurious—if injurious at all—than improperly made tea. Hundreds and thousands of girls ruin their digestion by taking tea from a kettle kept on the fire all day; but it is the tannin and not the caffeine that is to blame. There is not much tannin in the coffee bean.

No child should take tea or coffee. I do not say that older children are necessarily hurt by occasionally taking a little very weak tea, but they are safer without it. The bright, active brain of a child always "on the go" has no need to be stimulated; and these things are only stimulants, not foods. Also, in encouraging children to take these things, we interfere with their contentment in taking really important things like milk. Again, many a child who has tea late in the day is found to be excited and unsleepy at night, and the tea is the real reason.

WHY CHILDREN MAY DRINK COCOA FREELY WITHOUT HARM

Cocoa differs from tea and coffee in one or two important ways. It also contains a substance which is closely related to caffeine; but it is so weak a stimulant that it is not worth mentioning, and therefore we may freely permit children to drink cocoa, though we forbid them tea and coffee. This is a very important point, because children like hot things, and hot drinks are often very good for them; and if we flavour hot milk with cocoa, we can persuade them to take it better. It is wonderful how much milk and sugar we can get inside a child with the help of a substance like cocoa.

Many people suppose that cocoa itself is a useful food; but, as a matter of fact, we do not use much cocoa in the cup, and what there is is quite unimportant as a food. The fat in cocoa, which is useful in its small degree, is often apt to upset the digestion, and so many children will not touch cocoa. It is worth knowing that different kinds of cocoa differ a good deal in the way they are made, and the child who refuses to take one kind will perhaps quite readily take another which may, for instance, contain less fat of the bean.

CHILDREN MAY EAT CHOCOLATE FREELY IF THEIR TEETH ARE PROPERLY CARED FOR

To praise cocoa is to praise chocolate, which is a splendid food. When we take chocolate, we are not merely taking solid cocoa, with such food-value as it has, but we are also taking a very large quantity of sugar. The soldiers, when fighting in South Africa, learnt how pleasant and how sustaining chocolate is. Most children love chocolate, and are quite right, too. The plain chocolate, which is cheaper, is really better

for children, both as a food and for other reasons, than cream and fancy chocolate bonbons. We often notice that some children are wise enough to prefer plain chocolate to the elaborate and fancy things which tempt their elders. If children's teeth are properly used and properly cared for, the sugar of chocolate need not be feared. Far the finest teeth in the world among human beings belong to negroes, who very nearly live on sugar-cane.

ALCOHOL AND TOBACCO ARE NOT FOODS, BUT POISONS

We have already learnt that we are bound to study from the food point of view everything that enters the body, whether it be what we usually call a food, or whether it be a gas, such as the air which we breathe. Many of us are in the habit of taking into our bodies various substances which are not foods, but which we take as if they were foods, and which we certainly ought to understand. The most important of these things are tobacco and alcohol.

Nowadays there are a good many others which a certain number of people take, but we need not discuss them, especially as what is true of tobacco and alcohol is largely true of them. These substances are both poisons; in other words, a sufficiently large dose of them—the exact amount depending upon the weight and age of the particular person, on whether he has taken the drug before, and so forth—will kill. That the smoke of tobacco is a poison no one questions, though a great many people who know nothing about the subject question whether alcohol is a poison. They think it is absurd to call alcohol a poison, because many take it daily without being killed.

THE POISON THAT WILL KILL AND THE POISON THAT WILL NOT KILL

But for every poison in the world there is a dose that will kill and a dose that will not. This is true, for instance, of the carbonic acid in the air we breathe. Carbonic acid is a poison, but it will not kill except in the poisonous dose. In lesser doses it merely injures, or else the body resists it altogether, and is not hurt. But when the body has to do this with anything that threatens it, it has to pay a fair price. Tobacco is the leaf of a plant, and this leaf contains various substances, including a special one called *nicotine*, which, when given by itself, is intensely poisonous. It seems to be true of both nicotine and alcohol that they are poisons in their degree to every form of life. A third of a grain of nicotine has killed a man. People who take tobacco may smoke it, or they may chew it, or they may grind it up and take it in the form of snuff. It does not matter for us here in what form the tobacco is taken, for the results are the same. Of course, we understand that when the leaf is burnt, great chemical changes must be produced in it.

People have said that the nicotine and the other poisons in tobacco smoke must be burnt up, when tobacco is smoked, or oxidised away into carbonic acid and water. But anyone who tries to smoke a pipe for the first time will soon discover that something very curious gets into his body, and it has lately been proved conclusively that tobacco smoke *does* contain nicotine.

THE GREAT DANGER OF THE POISONOUS NICOTINE IN TOBACCO

The nicotine is destroyed in the tobacco that is burnt, but somewhere between the place where the tobacco burns and the smoker's mouth, the nicotine is made hot and turned into gas and sucked in. If the smoker merely drew nicotine into his mouth, and then puffed it out again, there could be no consequence except upon his mouth itself. The effect of smoking depends not upon what is drawn in, but upon what is absorbed; just as the effect of eating depends not upon what is swallowed, but upon what is absorbed.

However, nicotine is a very volatile, quick substance, and easily passes through the lining of the mouth into the blood. Unwise people sometimes have the trick of breathing tobacco smoke right into their lungs instead of merely sucking it into the mouth and puffing it out again, and they will even teach boys how to inhale the smoke of cigarettes for themselves. This is very difficult to stop once we start doing it. It means that far more of the things in the smoke are absorbed, because the whole great surface of the lungs—equal to 2,000 square feet, as we know, if it were spread out—is exposed to the smoke, and it is a surface that is specially made and suited for transferring

gases from one side of it to the other. Also, directly the smoker starts inhaling, this means that the smoke is now passing between his vocal cords, as they are called, with which he speaks or sings. Smoke is crowded with solid particles, which are caught on the vocal cords. Many of the gases in the smoke are very irritating, and all are hot.

How tobacco smoking spoils the voice and endangers the lungs

Thus, everyone who regularly inhales tobacco smoke is absolutely certain to spoil his voice sooner or later, even if nothing worse happens. It would be very easy to exaggerate the ill-effects of ordinary smoking; but there is a very great difference indeed, as we now understand, between puffing smoke in and out of the mouth, and inhaling it between the vocal cords into the lungs. Anyone who teaches and encourages a boy to do this is not that boy's friend, but his thoughtless and cruel enemy.

Enormous numbers of grown-up people smoke without its being possible for anyone to show that they do themselves any harm. As in the case of many other poisons, the first effects do not return. We have already learnt how marvellous is the power of living creatures to adapt themselves to circumstances. So, as a rule, the body learns, in a short time, how to take the gases of the smoke without being upset by them. The scientific way of saying this is that the body acquires *immunity* against the poison. The same applies to many other poisons, such as opium. In the case of opium, and some other poisons, the dose has constantly to be increased. This is not so much noticed in the case of tobacco.

But in the case of all these substances the rule is that at a certain time after we have taken the dose which satisfies us, we find that we want another dose. Certain changes which we are now beginning to understand occur in the body.

Why a smoker becomes restless and why tobacco soothes him

What happens appears to be that the original poison, such as the nicotine, or the morphia of opium, is broken up inside the body, and another substance is produced which has just the opposite effect upon the body. This may sound peculiar; but, in point of fact, we know scores of plants containing two oppositely acting substances, one of which is derived from the other. So what happens in the case of the smoker is, for instance, that the nicotine forms an "opposite of nicotine," which makes him just a little restless and uneasy; and then when he takes some more nicotine—that is to say, when he smokes again—this makes him feel restful and contented. So there is established what is usually called a "vicious circle." It is very often pointed out, and quite truly, that smoking has a good effect upon a man, because it makes him feel more contented and restful, and improves his temper. Quite so; but we ought to add that the reason why he wanted these things done for him is that his temper and contentment had been upset by the after results of the last time that he smoked.

A man may have smoked for many years, and yet, in only a few days, if he stops altogether, he may lose the craving, just because his body gets rid in that time of the last remains of the things that are made in it, which make him want to smoke again. After smoking without a break for fourteen years, the writer has just made this experiment upon himself, and so he knows that what has been said is true.

The great advantage of not smoking at all

Most smokers know in their hearts that they smoke too much, and wish to cut the amount down. There are various ways in which they may do this. It is good, for instance, to make a rule about smoking only after meals, or only after a certain hour in the day; or to make a rule of not carrying tobacco about in one's pockets. Many people have found that if they suck strong peppermint lozenges, this helps them to cut down their smoking.

All authorities on the subject will admit that it is best not to learn to smoke at all. No one can call smoking natural; no one can prove that it does any good except to relieve the symptoms which it has itself created, and which the relief of them will again create; and even if there be no injury done to life, which may well happen in cases of tobacco blindness, tobacco heart-weakness, and so on, there is always a certain amount of injury done

to the pocket. But, even supposing that anyone tried to argue that smoking was really a good thing for grown-up people, at any rate no one would dare to argue that it is good for children, or young people of any age or of either sex. No one can say that the child needs the tobacco; no one can show that the tobacco does the child any good. All the likelihood, of course, is that the developing body will be more injured than the already developed body. That is true without exception of every poison or injurious substance known, and is equally true of all living things, plants, animals, or human beings.

THE THINGS THAT MAKE A MAN AND THE THINGS THAT MAKE A SHEEP

Tobacco being a poison, no boy enjoys his first experience of it. He is encouraged to go on by an argument which would be quite the best argument in all the world if it were true. It is, that he should "be a man." This argument is applied to boys about things far worse than tobacco smoking. The boy is to smoke or drink, or whatever it be, because others who are older than himself do it; and so they say he will prove himself as much a man as they are. The real mark of a man is not that we should smoke, or drink, or shave, or be six feet high; the real mark of a man is to be ourselves, to do things or not to do things because we so think fit; and the mark of not being a man, however old or big we are, is to do things because other people do them. So when they say "be a man," they really mean "be a sheep"; and that is what we should reply in such a case. This is a very important matter, because it applies to many other things besides smoking; and it would be quite important enough even if it only applied to that.

THE KIND OF BOY WHO IS A REAL MAN AND MAKES HISTORY

The writer remembers, as if it were yesterday, his feeling of being grown-up and manly, and as clever as older boys, when he first smoked. No one expects boys to have the sense of men, and it is natural for boys to feel manly in such a case when older boys admire them. But the difference between a real man and a sheep remains; and, if it comes to that, just as a grown-up man can be a sheep, so a boy can be a man at any age, not by making himself feel miserable in doing the things grown-up men do, but by deciding for himself what to do, and what not to do, without reference to foolish people. It is this kind of boy and this kind of man that makes history, that has made the world what it is worth to-day, and will make it worth more in the future.

There has been a good deal of talk in many states during the last few years about this question of children smoking, and it has been agreed by everyone that it ought to be stopped. It is not at all easy to do, because the proper way to do what is needed for children is through their parents, and there are children whose parents do not care—babies in perambulators whose mothers give them beer to sip, and little schoolboys whose fathers are quite proud to see them smoke a cigarette. However, in England and in some of our states also, laws have been made which deal with children smoking, and which will do something, at any rate, to protect children from themselves and from foolish people in this respect.

THE KNOWLEDGE THAT HELPS US TO DO RIGHT AND ACT WISELY

Any child under sixteen found smoking in the street or in a park must be stopped by the policeman or the park-keeper; and any boy so found smoking may have his pockets searched. Tobacconists may be punished if they sell cigarettes to children. No doubt these are quite proper laws; but we must not forget the usefulness of knowledge, and the wisdom of trying to make people sensible so that they can govern themselves. It is a thousand times better for a boy not to smoke because he has learnt about smoking, and has decided that it is more sensible for him, on the whole, not to smoke, than not to smoke because he is never sure whether there is a policeman round the corner. There are always these two ways of getting people to act properly, and no doubt the way of compelling them from the outside is often necessary; but the people whose lives are worth most to themselves and to the world are those who govern themselves wisely from within; and knowledge has its highest value because it helps them to do so.

The next part of this is on page 3561.

WHAT THESE PICTURES SHOW US

WHEN you write letters to your little friends, have you thought how wonderful it is that all you have to do is to put a stamp on the letter and drop it into a box? The little green post-boxes in the streets are like fairies' houses: if you post your letter in them you may be quite certain that it will find your friend. It does not matter where your friend lives — whether across the sea in a far-off country, in a little village, or in a great town. If the magic stamp is on the letter, the letter will find its way to the right place. The postman is one of the real fairies of the world, and we read here the way in which he sends our letters on their journeys through the world.

HOW OUR LETTERS COME TO US

CONTINUED FROM 3192

WHEN you go to your breakfast some morning you may find that a letter has come from your uncle or your big brother across the sea.

Suppose that it is from the Hawaiian Islands. The distance is nearly six thousand miles from New York.

It has cost only two cents to send that letter all those thousands of miles. It may have been posted in some little office on one of the islands with a two-cent stamp on it. Then it was put into a bag and taken to the post-office in Honolulu. Then it was put into a bag containing many more letters for the United States.

This bag was put on a ship, carried to San Francisco, put on a train and carried to New York. There the bag was opened, your letter taken out and at last brought to you by the postman.

Now let us see what happens when we send that letter away for other friends to read. Suppose they live in Buffalo.

We put the letter into an envelope, write the address on the outside, put on a two-cent stamp, and drop the letter into the green post-box on the corner. Soon the postman comes, unlocks the box, takes out the letter with the others, and hurries off with them to the post-office.

Many other bags of letters are there, hundreds and thousands of letters, going to all parts of the world. They are emptied out of their sacks and given to one who has a little machine which marks all the stamps on the letters. This machine also prints the name of the office, the date, and the time the letters were received. It works very quickly, printing several hundred every minute. Then off go the letters to another man, who looks quickly at them. Some are for Boston, some for Chicago, some for little places in the country. Your letter is for Buffalo, so let us follow it.

Into a bag it goes with hundreds of others; then off to the railway station to catch the train which carries the mails. There is a complete little post-office on the train, and while the train shoots along, men work just as if they were in a city post-office.

They open the bags and begin to sort the letters again. The letters which go to the smaller places where the train does not stop are put in bags, which are arranged mouth upward, before the mail clerks. As the train approaches one of these little stations, the bag is closed and locked. One of the mail clerks stands in the door of the mail car, which has doors on the side instead of on the end.

At nearly every little station is a post, the use of which you will see. As the train comes to the station almost at full speed, a bag is thrown out,

THE STORY OF THE LITTLE GREEN MAIL-BOX

When you post a letter to your friend in this letter-box you need have no fear. The letter will find its way safely to any part of the world if you put a stamp on it.

Nobody but the postman can touch the letter after you have posted it. The postman clears the box, and carries the letters in his bag to the post-office.

At the General Post Office the letters are all put in a heap and carefully arranged. All the letters for the city are put together, and all the letters for New England, the South and other sections are put together. They are then placed in bags and labelled for the State or town; and the bags are then taken to the station.

HOW THE MAIL TRAVELS

This is the Twentieth Century Limited running at full speed on its way from New York to Chicago in eighteen hours. It stops for passengers only at the largest cities, and the change of engines is made in a few minutes. Our grandfathers spent weeks on this journey, now made with comfort in less than a day and night.

This is the interior of a mail car on a long run. This car carries mail for distant points, and here you see the clerks, who are employed by the government, distributing it into proper sacks, which are held open before them. They grow so expert that they almost never throw a piece into the wrong sack.

Pictures by courtesy of the New York Central Lines.

No time is lost in taking letters on their journey. This shows how a ship delivers letters without stopping. The big ship has brought bags of letters from China, and as it passes the great seaport towns it slows down while a little ship sails by the side of it and receives the bags. Both these ships are moving.

and the train never stops. But attached to the post is a bag of letters which is to go on the train. A hook from the mail car is extended and draws the bag into the car. In this way, while the train is racing along at a mile a minute, one bag of letters is left at a town and another bag is taken up. If you have written a letter to the town, it is dropped at the station as the train passes by; if you have a friend there who has written to you, the letter is picked up by the train as it passes the post.

By the time that the train reaches Buffalo, your letter has been made ready to be delivered.

All this has cost you only two cents. If you wanted to send only one letter across the sea, and had to get a ship specially to carry it, it would cost you thousands of dollars. But it is as easy to take a thousand letters across the sea as to take only one, and so the Post Office gets thousands of cents for one journey.

There are places where it is very hard to get a letter. Dr. Livingstone, the great traveller, lived for five years without ever having a letter, and there are parts of Africa still where it is very hard to get letters. When they are taken off the ship, they are sent up the country by rail, as far as the trains run. Then they are made up into bundles, and men carry them on their heads through the swamps and the jungles, where snakes and wild animals are. In some parts of Africa the mails are carried on the backs of camels. Not long ago a camel broke away in the night. It ran away and died in the desert, and could not be found. It carried on its back a bag of letters for people far away in the wild country, who would be very sad when the man arrived to tell them that their letters were lost.

At last we hear the postman's knock, and our little friend receives her letter. It has come safely home after many exciting adventures by land and sea, and we may be sure that it is opened with great delight.

There are little islands where the ships call perhaps only once a year. One of them is Tristan d'Acunha, in the Indian Ocean, where letters are only delivered about once a year. A copy of the CHILDREN'S ENCYCLOPÆDIA has been posted to the youngest child on this island, who will probably not get it for six months.

THE NEXT FAMILIAR THINGS BEGIN ON PAGE 3309

THE BUSIEST STREET IN THE WORLD

When we see a street like this, in the heart of a busy city, we understand the need for some rule of the road. Were omnibuses and carts allowed to go to the right or left as they thought fit there would be hopeless confusion, and all traffic would be at a standstill. The street shown here is Mansion House Street, in the centre of the City of London, which is said to be the busiest thoroughfare in the world. Eight or nine different streets meet here, and many thousands of vehicles pass to and fro every day. In England the road traffic passes to the left instead of to the right, as in the United States and on the Continent of Europe.

THE FATHER OF ENGLISH POETRY

GEOFFREY CHAUCER READING POEMS FROM HIS CANTERBURY TALES AT THE COURT OF EDWARD III.

Chaucer, the first great English poet, lived in the 14th century, before the days of printing. The poet was a favourite at the court of King Edward III., and at times he would read his poems before the king and his courtiers, in the way which Ford Madox Brown, the celebrated painter, has illustrated so happily in this picture.

William Shakespeare with some of the great men of his time

FOUR GREAT ENGLISH POETS

CHAUCER—SPENSER—SHAKESPEARE—MILTON

CONTINUED FROM 3252

It is well to know something of the lives of the great poets, not merely because they may be interesting to us as men, but because in knowing their lives and remembering the periods of time in which they lived and wrote, we are gaining something towards the understanding of English literature. Thus, if we remember that the first really great English poet was Geoffrey Chaucer, who was born about the year 1339, we shall always have his lifetime fixed in our mind as an important period in the history of English literature. It is true that before Chaucer there were many poets, but most of them were of the monkish class, who wrote the Latin tongue, and none of them compare with Chaucer for lively imagination, knowledge of life, and broad sympathy with their fellow-men. One of the most notable of these very early poets was Caedmon, about whom we have already read in the CHILD'S BOOK OF POETRY.

As Chaucer is very rightly called "The Father of English Poetry," we cannot do better than begin with him. Naturally there is not a great deal to be told of the life of a poet who lived more than 500 years ago. His works are the chief means we have of discovering the character of the poet, and through them we get to know that Chaucer must have been a very hearty, good-natured, laughter-loving sort of man, who did not take life too seriously or yet too lightly. Indeed, if we may judge him as a man by the impression which his poetry leaves on us, we can say that Chaucer was in every sense a typical Englishman, not only of his own time, but of all time.

He loved the simple things of life; he rejoiced in the beauties of Nature; he was fond of his books, and liked to be comfortable at home; he could laugh with the merriest at any tale of roguery, but he had his serious side and a reverence for religion. These are all qualities that may be found in the true Englishman, and it is thus that, through his writings, we can form some idea of the character of the man.

It is true that the name of Chaucer is not an English name, and his remote

forefathers may have followed William the Conqueror from Normandy into England, as the name was evidently of French origin. But, however that may be, his father, John Chaucer, was a citizen of London and a wine merchant there at the time of Geoffrey's birth. Geoffrey must have come of a good family, for he had the education of a gentleman, but we do not know whether he was a scholar of Oxford or Cambridge, although he has been claimed for both of these universities.

How Edward the Third helped to pay the ransom of Chaucer

As a young man he would seem to have been of very attractive character, for he became a great favourite at the court of Edward III., and was taken a prisoner in France when following the king as a soldier, the king himself showing his interest in his follower by contributing $80, which at that time was a considerable sum of money, towards his ransom. But the young poet was more particularly a friend and follower of the king's son, John of Gaunt, and by his marriage, at the age of twenty-six, to Philippa de Rouet he became brother-in-law to that famous prince. We may suppose, therefore, that, although we only know of his father as a prominent citizen and a seller of wine, the Chaucer family was of sufficient eminence for Geoffrey, with his many native gifts, to find the way open to success at the king's court.

Indeed, during the reign of Edward III. his life was filled with prosperity, and he held various posts in the service of the king, and went abroad at different times as ambassador.

Chaucer's visit to the continent and what he learned there

It is thought that on one of these missions, when in Italy, he may have met the great Italian poet Petrarch, who was one of the foremost figures at that time in the mighty movement which we describe as the Renaissance. This word really means a re-birth, and by the Renaissance is meant the renewal of intellectual energy, the flourishing of a new love for the beautiful things of the mind, which are expressed in great literature, painting, and sculpture. For long ages after the decline of the ancient learning and arts of Greece and Rome, these beautiful things had, like the plants in the winter-time, been asleep, but in the age of Chaucer they had, as it were, shot up again and burst into flower. Italy was the centre of this new flowering of the arts, and it was Chaucer's splendid work to import into English literature something of this new spirit which had arisen on the Continent.

But we must remember that he was not a writer for gain, as most writers are in later times. His was the life of a courtier and a gentleman, and his writings were the fruit of his leisure, the expression of his own joy in life. Nor were his days all smooth and easy, as he did not find King Richard II. so kind to him at first as Edward III. had been; but after a time he gained the favour of that monarch, and when Henry IV., the son of his old friend, John of Gaunt, came to the throne, he again enjoyed prosperity, although towards the end of his life he seems to have known the want of money at times. Whatever his troubles may have been, they never lessened his love of poetry, and some of his finest pieces were written in the autumn of his days.

The death of Chaucer and the birth of Spenser, the next great poet

Chaucer died in 1400, and as he had lived before the invention of the printing press, his writings during his lifetime had circulated only in handwritten copies; but about seventy-five years after his death the famous printer, William Caxton, brought out the first printed edition of "The Canterbury Tales." A selection of stories from these has been printed in the CHILD'S STORY OF FAMOUS BOOKS.

After the death of Chaucer, many years passed before another great poet arose in England. Indeed, the century and a half between his death and the birth of Edmund Spenser is often described as the "twilight of genius," by which is meant a time when there were no men of great gifts devoting themselves to the art of literature. Perhaps the reason for this lay in the fact that for many years England was torn and distracted by civil war, and men had but little time for the gentler things of life. But when Edmund Spenser arose as a new poet, he heralded the coming of the greatest outburst of poetic genius in that country's history. He was really the first of the great Elizabethan poets.

SPENSER READING HIS POETRY TO RALEIGH

Edmund Spenser was the herald of a great revival in English poetry. In his poems we see the last traces of the English language as it was written by Chaucer, while he has brought the modern English, soon to blossom in Shakespeare's poetry, within sight of perfection. Spenser at one time of his life experienced good fortune and was a friend of many eminent men, although he died in poverty. In the above picture we are shown the poet in his happiest days, reading some pages from his newly written "Faerie Queene" to Sir Walter Raleigh.

Edmund Spenser was born in London, most likely in 1552 or 1553, and came of a family of some distinction, though he was not born to worldly riches. He was educated at the Merchant Taylors' School, and was thus perhaps the first of the many famous men to pass through the school, which had then been but recently founded. He was a student at Cambridge, and later, because some young lady would not have him for a sweetheart, he turned to his study and the writing of verse in order to forget his disappointment. Many a one has done that since and produced the most deplorable verse; but Spenser, happening to be a genius, thus wrote "The Shepherd's Calendar," which was published in 1579, and has justly been described as "the first clear note of the great Elizabethan poetry."

A warm and intimate friend of Spenser's was the heroic Sir Philip Sidney, himself a charming poet, and it was due to his influence that Spenser, in 1580, received an official post in Ireland, where the remainder of his short life was passed, for the most part in pleasant circumstances. His fame as a poet rests on a great work of poetry now more often spoken about than read, "The Faerie Queene," from which we have read several stories in the CHILD'S STORY OF FAMOUS BOOKS, page 687. The first three parts of this work were published in 1590, and made his name famous even in his own day; but the end of his life was sad, for, during a rebellion in Ireland, the castle in County Cork where he resided was burned by the rebels, and Spenser had to flee.

Coming to London, it would seem that not all his fame could find him new friends in the hour of need for he died at a tavern in King Street, Westminster, on January 13, 1599, "for lacke of bread," according to Ben Jonson, another of the great poets who lived in Spenser's day. Spenser was buried in the Poets' Corner of Westminster Abbey. There he rests among those for whom he chiefly wrote, as he is often called "The Poets' Poet," because, thoroughly to understand and appreciate his writings, one must be something of a poet oneself. And he lives in literature not so much as a poet for all to read, but as a great and beautifying influence on other

writers, both of prose and poetry. The trouble now is not to name the famous poets, but which to leave out; for following Spenser they come so thick and fast, and so many are worthy of attention, that but for the mighty name of Shakespeare, which overtops them all, it would be difficult to pick and choose among the poets of Elizabeth's time.

SHAKESPEARE THE GREATEST POET IN A GOLDEN AGE

There are Michael Drayton, Christopher Marlowe, Ben Jonson, Philip Massinger, Francis Beaumont, John Fletcher, John Webster, George Chapman, and others who, in an age when no giant such as Shakespeare had lived to overshadow them, would all have seemed even greater men than we know them to have been.

But from this great and rich period of English poetry we are forced to take Shakespeare alone, and in him we have the essence of the whole, for all that was finest in the Elizabethan age is reflected and made immortal in the plays and poems of Shakespeare. At that time the stage rather than the study was the aim of all the poets. In the new energy which had come to old England, the poets, inspired by the mighty deeds of Elizabeth's victorious sailors who were opening up a vast and wondrous empire for England, had to choose models for their art, and they went back to the ancient days of Greece, when the poets wrote plays to be performed in the theatres of that wonderful land. That is why we call the revival of learning in Elizabeth's time a "classical revival." The chosen model of Shakespeare and his fellow-poets was the Greek drama, and in this respect the Elizabethan renaissance differs from the earlier renaissance, of which Chaucer was the finest product in England.

THE LITTLE THAT WE REALLY KNOW ABOUT THE LIFE OF SHAKESPEARE

One of the most surprising things in literary biography is the fact that, although one writer quite truthfully says of Shakespeare: "We know little more of him than we do of Homer"—and of Homer we know practically nothing, not even his birthplace—a whole library of books has been written about the man William Shakespeare. It would really seem that the fewer facts we have about the life of any great man of the past, the more books are likely to be written in attempting to tell the story of his life. The chief difficulty with Shakespeare is to conceive a man of such great genius as his works disclose who yet lived a very ordinary sort of life, for what little we do know of England's greatest poet scarcely bears out the imaginary picture of the man we are apt to draw in reading his plays.

In the little town of Stratford-on-Avon, still one of the most beautiful in the green Midlands of England, William Shakespeare was born on April 23, 1564. His father, although he had many ups and downs in his life, and seems to have been a jack-of-all-trades, cannot exactly be said to have been "in humble circumstances," as he cut something of a figure in the town, and was for a time its mayor. For all that, he was not a successful man, and the time came when his son William had to lend him money to help him out of difficulties. His father could not write his own name, and for all the writing which he himself did in later life, the only examples of his signature which have been preserved might be thought to indicate that even William wrote his own name with difficulty!

A DAY AT SCHOOL IN STRATFORD-ON-AVON WITH THE BOY SHAKESPEARE

The boyhood of Shakespeare would, in all probability, be passed like that of any other tradesman's son of the time, with the healthy sports of a rural town for pastime, and the local grammar school as his home of learning. He had an excellent teacher at the grammar school, Master Walter Roche, who received the handsome salary of $100 a year—but in those days a quarter was of as much value as five dollars is to-day—for acting as headmaster. William would have to be up betimes to take his place in the old grammar school, which is still standing, though considerably altered; for lessons began at six o'clock in the morning in the summer weather, as daylight was precious in those days, when such wonders as gas and electric light were still undreamt. But he would not have far to go

> with his satchel
> And shining morning face, creeping like snail
> Unwillingly to school,

as it was less than ten minutes' easy walk from his father's house in Henley Street to the local grammar school.

It is more than likely that this same young William Shakespeare was dressed just like the other lads of the town, in a long and loose cloak hanging nearly to his ankles, with short, wide sleeves, through which his arms were thrust. But his cloak would not altogether hide the more picturesque part of his attire, consisting of a short, well-fitting jerkin, his puffed hose sticking out from beneath the waist to the thighs, above his long, dark-coloured stockings. His shoes would be strange affairs that bulged somewhat at the toes, being tied with long ends of their own material, and the satchel wherein he carried his books would be the only thing about him that a schoolboy of our time might wear without attracting the attention of every passer-by.

As for the boy himself, we know him for a bright-faced lad with high forehead and dark, abundant hair, his eyes of a light hazel colour, full of mischief and healthy merriment. Whether he was a diligent scholar, the pride of Master Roche, or something of a trial to that worthy teacher, we do not know; but the poems he wrote in after life are so full of varied learning that we cannot but suppose the headmaster, who was famous for his teaching of Latin, found young Will Shakespeare one of his brightest and aptest pupils.

WHAT SHAKESPEARE WAS TAUGHT AT STRATFORD GRAMMAR SCHOOL

If a schoolboy of to-day were to read the lessons in natural history which Shakespeare and his fellow-scholars were taught, he would have good cause for laughter. "The blood of an elephant is the coldest blood in the world, and dragons in the scorching heat of summer cannot get anything to cool them but this blood." That is a startling statement from a natural history of his time, and will show how little Shakespeare could have known of the ways of wild life outside of his native woodlands, where, as a young man, it is said, he went hunting the deer, and was once haled before a magistrate as a poacher.

The crabbed and crooked style of writing, which was known as "old English," was the style taught by Master Roche, who was rather behind the times, as even then in London and the universities students were being taught that open flowing script known as "Italian," such as we write to-day. If we knew nothing else about Shakespeare, his signature would prove that he had been educated in a provincial town. But whatever the defects of the course of education at the Stratford Grammar School may have been, William Shakespeare learned enough there to enable him to express, with all the power of his wonderful genius, the great and beautiful thoughts that later blossomed in his mind. He received during his six years at the school the key with which he was later on to unlock the treasure-house of his imagination for all the world and for all time.

THE YOUTH OF THE POET AND WHAT HE DID AFTER HIS SCHOOLDAYS

Of Shakespeare's youth we know as little as we do about his schooldays. He would be fourteen years of age when his father's fortunes had sunk so low that, in all likelihood, John Shakespeare could not allow his son to continue longer at school, and would have him withdrawn that he might earn something to help in keeping the home. To what employment the young man turned his hand, we do not know for certain. It has been said that he was engaged as a butcher's boy, perhaps in his father's shop. It has also been said that he became a lawyer's clerk, the remarkable knowledge of the law which he displays in his writings being quoted as evidence in support of this, though it is no good reason for supposing he was ever so engaged. What we do know for certain is that he was none too wise a youth, for he was not quite nineteen when he married Anne Hathaway, the daughter of a well-to-do farmer near Stratford. His wife was eight years older than he, and we cannot suppose that his unfortunate father was happy at his headstrong son taking upon himself the responsibilities of married life when his help was so needed at home.

YOUNG SHAKESPEARE GOES UP TO LONDON TO MAKE HIS FORTUNE

Three or four years after his marriage, and when he was the father of three children, Shakespeare went to London to seek his fortune. How he lived in London during his early years there, we do not know, but the story that he was glad to hang about the theatre to earn a little money by holding gentlemen's horses may be as true as

anything else we know of his early life. About 1587 he became a member of one of the very few theatrical companies which existed in those days, and possibly started in some such humble office as that of prompter, the man who stands behind the scenes with a copy of the play to prompt the actors should they forget their words.

We know that by 1590 he had begun to try his hand at writing, or perhaps revising, plays, while he was now himself appearing on the stage as a performer. He seems, however, to have been no brilliant actor, and even when his own plays were acted he never had any important part to fill in them. Fortunately for the world, he was something far greater than the greatest actor that ever lived, and it is to the credit of the Londoners of his time that his series of great comedies and tragedies, which began, most likely, with "Love's Labour's Lost" in 1591, and ended with "The Tempest" in 1611, met with so hearty a reception that their author, who had also become part owner of the Globe Theatre, was a comparatively rich man in the year 1600.

SHAKESPEARE MAKES A FORTUNE AS AN ACTOR AND A WRITER OF PLAYS

His plays, however, did not bring him so much money as he earned by acting. It is often the case that great work is but poorly rewarded, while inferior work enables men to grow rich. It was so with Shakespeare, for although he was famous as a playwright and a poet in his own day, that fame would have brought him but little profit, whereas his very ordinary powers as an actor enabled him to earn $650 a year, which would be equal to fully $5,000 at the present day. Unlike most of the actors and poets of his time, Shakespeare was a thrifty man, and so by the year 1597 he was able to purchase the largest house in Stratford, known as New Place, which stood close by the grammar school of his youth.

He still lived in London, however, where he had a house near to the Blackfriars Theatre, and no doubt there was some element of pride in his purchase of New Place, for he did not occupy the house himself until he bade farewell to London and the stage in 1612. All men have a desire to stand well in the estimation of their fellow-townsmen, and probably Shakespeare was not above wishing to impress the folk of Stratford with an object-lesson in his worldly success. To see the son of the unfortunate John Shakespeare become the owner of the largest house in the town would impress them more than to know that he had earned fame in London as a poet and playwright. He would also have in mind the day when he meant to retire and settle down in ease and comfort in his native town.

WHAT A THEATRE WAS LIKE IN THE TIME OF SHAKESPEARE

But the most successful years of Shakespeare came after 1600, when his popularity both as a dramatist and an actor was at its highest, and the success of the Globe Theatre brought him a splendid income. The theatres of those days did not resemble the luxurious buildings of our time. Outwardly, they looked not unlike a sort of castle tower without a roof. Around the inside of the walls the seats were fixed in three galleries above each other, and from one side the stage was built out, occupying almost one half of the interior.

No scenery was used, and part of the audience sat in boxes behind and above the stage, and even at times on the stage itself, while the people in the arena or pit had to stand. Nor were there any actresses in Shakespeare's time. The female parts were all performed by boys or young men dressed like women, and thus the great dramatist, who conceived such sweet and noble women as Rosalind and Desdemona, never saw them embodied by actresses. But if there is not a great deal we can tell about Shakespeare the man, there is almost no end to what might be written about his wonderful plays and the life of his time, but here we cannot further dwell upon the subject, though it is of the deepest interest.

SHAKESPEARE'S FAREWELL TO LONDON AND HIS RETURN TO HIS NATIVE TOWN

We know that so successful was the playwright Shakespeare in the later years of his life in London, that his income was as much as $25,000 a year in the money of our day, and he was steadily adding to his landed possessions at Stratford, whither he withdrew from the gay and busy life of the great city, and settled down as a man of wealth and property in 1612. "The latter part

SHAKESPEARE IN TROUBLE & IN TRIUMPH

This picture, by Thomas Brooks, illustrates a well-known story of Shakespeare's youth. The poet is said to have been arrested for illegally hunting deer in the forest at Stratford and brought before the magistrate, Sir Thomas Lucy. It is quite possible that the story is true, and certainly in later years Shakespeare made sly fun in one of his plays of this same Sir Thomas, which seems to show he had some old score against him.

In this picture, by Eduard Ender, Shakespeare is seen at the height of his fame in London, reciting his great tragedy of "Macbeth" before Queen Elizabeth and a group of her courtiers. Although we have no knowledge that such an event ever took place, it is certainly a pleasant picture to contemplate the greatest poet thus entertaining the greatest English queen in that wonderful age when the British Empire came into being.

of his life," says the dramatist Nicholas Rowe, who edited an edition of Shakespeare's works in 1709, "was spent as all men of sense wish theirs may be, in ease, retirement, and the conversation of his friends." He saw both his daughters married, his only son having died in his twelfth year, and he went about among his townsmen just like an ordinary country gentleman. It is pleasant to contemplate this aspect of the greatest poet. The time had not yet come when men made a profession of literary work, and pretended to be a class apart from the general community.

Shakespeare wrote his great plays only to supply his fellow-actors with something to perform, and they were immortal works because their writer had immortal gifts of mind which were fated thus to be conveyed to mankind at large. He went to no university to equip himself for the task, for no training of professors or tutors could have breathed into him one little spark of the divine genius inborn in the man, which was bound to shape itself somehow.

THE LAST DAYS OF ENGLAND'S GREATEST POET, AND HOW HE DIED

Shakespeare came at the right time, when interest in the stage as a medium of poetic entertainment and instruction had revived, and his native powers were so much greater than those of all the scholars of his day that even in an age when learning and scholarship were dearly prized, and he had less, in a scholastic sense, than many of his fellow-dramatists, he outshone, and will outlast, them all. In every sentence of his plays and poems we can see the easy, confident hand of a mighty master, and we know that he himself was conscious of his greatness, for he writes in one of his beautiful sonnets:

Not marble, nor the gilded monuments
Of princes, shall outlive this powerful rhyme.

In March, 1616, the poet was taken with illness, which is said to have been the result of a merry meeting with his friends Michael Drayton and Ben Jonson, who had visited him at Stratford; and on his birthday, April 23, 1616, William Shakespeare died in his fine house at Stratford. He was laid to rest in the chancel of the parish church, where over his grave these words are carved upon a flat stone:

Good friend, for Jesus' sake forbear
To dig the dust enclosed here.
Blest be the man who spares these stones
And curst be he who moves my bones.

We know not who wrote these lines, but no one has ever ventured to break this solemn command, and there the dust of England's greatest poet still reposes.

THE BIRTH OF JOHN MILTON AT THE SIGN OF THE SPREAD EAGLE IN LONDON

When Shakespeare died at Stratford, there was an eight-year-old boy in the City of London who was destined to be not only the next great poet to Shakespeare in point of time, but, after Shakespeare, the greatest of all English poets. His name was John Milton, and he was born in Bread Street, off Cheapside, on December 9, 1608. In those days it was the custom of tradespeople and others to hang a sign at their door, exhibiting some device by which their place could be easily recognised. This old-fashioned custom is still observed to-day, though less frequently than formerly. Among the many signs that decorated Bread Street three hundred years ago was one of a spread eagle. At the house so marked lived John Milton senior with his family, and there he carried on the profession of a scrivener. This work was in some respect like that now discharged by solicitors, such as drawing out wills and preparing other legal documents; and scriveners were also lenders of money.

This John Milton senior must have been of strong, independent character, for he had brooked the displeasure of his father by renouncing the Catholic religion, which had been the faith of his family, and adopting Protestantism.

THE GREAT STRUGGLE THAT WAS BEGINNING WHEN MILTON WAS BORN

He was thus one of the Puritans, as they were called, for these were the days when a great struggle was dimly beginning between two different types of the English mind. Although the country was supposed to be Protestant, and the king a Protestant also, many people were at work to shake the religion of the land, and while these would have permitted much that was loose and lax, there grew up against them others who, going to the opposite extreme, took the letter of the Bible rather than its spirit as their guidance, and became noted for their strict observance of religious duties.

These were the Puritans, who in the lifetime of the younger Milton were destined to carry out a great revolution in England. Although the father of the poet belonged to those strict religionists, he was a man of literary and musical tastes. His qualities were inherited by his son, and the seed of poetry, which young Milton had received from his old Puritan father, blossomed in time into one of the finest flowers of the world's literature.

The boy Milton would be about twelve years of age when he was entered as a scholar at St. Paul's School, his education before that time having been received at home from a Scots tutor.

OLIVER CROMWELL AND HIS FAMILY LISTENING TO MILTON PLAYING THE ORGAN

Great was the boy's love of books, for not even his weak eyes and the headaches which resulted from his close studies prevented him, even at this early age, from poring over his well-loved books beyond the midnight hour. A day was to come when the strain thus placed upon his sight was to leave him blind, but even then he had the consolation of knowing that he had used his eyes to some purpose by storing his mind with the richest knowledge of his age. For even as a schoolboy he had learned his Latin and Greek so well that he could write in both these classic languages in prose and verse, and of Hebrew also he knew something. Among his earliest efforts in verse-writing were translations of the 114th and 116th Psalms. He was in his sixteenth year when he went to Cambridge University, where we are told his gentle manner, his long, light-brown hair, parted in the centre as we see it in the familiar portraits, his delicately coloured complexion, gave him, among his rougher classmates, so girlish an appearance that they christened him "the Lady of the College." But we may doubt if their taunts in any way ruffled his calm and independent spirit, as we know from his own words that even from boyhood he was conscious of his mighty powers of mind. He puts it in his own fine words in the following lines:

When I was yet a child no childish play
To me was pleasing; all my mind was set
Serious to learn and know, and thence to do
What might be public good; myself I thought
Born to that end, born to promote all truth,
All righteous things.

Sometimes the great man does not seem to know himself as great, but we have seen that Shakespeare was just as confident of the immortality of his poetry as Milton of the high destiny to which he felt himself called. And the study of his life also leaves us with the impression of a calm and noble spirit that was a stranger to haste, moving serenely but confidently onward to the work that was designed for him. He had been fully seven years

at Cambridge when he quitted the University with the degree of M.A., and went to his father's country house at Horton, in Buckinghamshire, where five more years of his life rolled on in the study of books and Nature and the writing of many poems which rank among the finest in the world.

MILTON RETURNS TO LONDON ON THE EVE OF THE CIVIL WAR

His mother's failing health had kept him at home, but when she died he was free for a time to set out on his travels and to see for himself those wondrous towns and countries of the Continent whose stories and literature he knew so well. So for some fifteen months he wandered among the storied towns of Italy and France, and the influence of the classic scenes of Italy did much to shape his thoughts towards the later poetical achievements of his life.

When he returned to London in 1639 the struggle between the people and the king, which three years later resulted in the Civil War, had become so serious that the whole country was unsettled. But Milton was essentially a man of peace, and instead of taking part in this great agitation, except by writing a series of bitter attacks upon the bishops, who were in league with the king, he devoted himself to the quiet task of teaching, and had a sort of boarding-school for a number of years in Aldersgate Street. But the bitterness of the struggle which was going on in these unhappy days entered into the poet's life in a strange way.

He married a lady who came of a Royalist family and had all the gay and flippant notions of the Cavalier class, who were the opponents of the Puritans.

MILTON MARRIES A ROYALIST LADY BUT IS STAUNCH TO THE PURITAN CAUSE

As Milton was, in his ways of life, the most grave and frugal of Puritans, it was not likely that his young wife could immediately find happiness with him, and after a few weeks she returned to her father; but two years later, when the fortunes of war had gone against the Royalists and their supporters, and Mary Milton had learned that life is something more than dancing and merry parties, she returned to her husband, and even her father was glad to have the shelter of the Puritan poet's roof.

Milton, in the meanwhile, had been writing not poetry but prose, and his finest work of this period was entitled "Areopagitica." That is a Greek word for an oration addressed to the Greek Parliament, which was known as the "Areopagus," and Milton gave this title to his work because it was addressed to the Parliament of his own country. The "Areopagitica" is a noble plea for the liberty of thought and especially the right to publish in print one's honest opinions, and is regarded as one of the finest examples of English prose writing. Another prose work of Milton's, in which he defended the execution of Charles I., had an important bearing on his life, for it was esteemed so highly by the Puritan Government that Milton was appointed Latin Secretary to the Council at a handsome salary, his work being to draft the correspondence of the Government with foreign Powers, then carried on in the Latin language.

THE SAD, SIGHTLESS DAYS OF THE CLOSE OF MILTON'S LIFE

A new period of the poet's life now began. Eminent in the public life of his day, his great literary powers were employed, not in the mere translating of State correspondence, but in defending the Puritan Government against its critics on the Continent. It is the least pleasant picture of his career to look upon, for we feel that Milton was far too great a man to expend his powers in this direction. In 1653 he was left a widower with three young daughters to look after; but the greatest trial of his life befell him about the same time.

His eyes, which had been weak from boyhood, now failed him completely, and by the year 1654 the poet was blind. Still he bravely faced his work as Latin Secretary, first with an assistant, and afterwards with the aid of a colleague, Andrew Marvell, who was himself a poet of great power, and a man of fine character. For the sake of his motherless children he married again, but his second wife died some fifteen months after the wedding; so that Milton's daughters, at the most critical time of their lives, were left without a mother's guidance, and in later years were somewhat of a trial to their sightless father.

But if the eyes of his body no longer saw the beautiful things of earth, the

TWO SCENES IN THE LIFE OF JOHN MILTON

Milton was the great thinker in the days of the Commonwealth, when Oliver Cromwell ruled England with a firm hand. Both men did imperishable service to their native land. The poet in those days could not have lived by his poetry, and he was employed by the Government to conduct the official correspondence of the country with foreign Powers in the Latin language, then used for that purpose. While so employed he lost his eyesight, and had to have a colleague in his work. This colleague was a fine poet and a man of upright character, Andrew Marvell by name. In this picture, by G. H. Boughton, R.A., we see Marvell shaking hands with the blind poet.

As Milton was blind during the last twenty years of his life, and in those years composed some of his greatest poems, including "Paradise Lost" and "Samson Agonistes," his daughters had to be his eyes and write down the words as he dictated them. In the above picture, by Munkacsy, we see his daughters thus engaged, and perhaps none too willingly. For they grew tired of the labouring work which their father's blindness required of them, and in the later years of his life they behaved in a very undutiful way, much to the sorrow of the great poet.

eyes of his soul had now far finer visions of the unseen world, and in his leisure time he was engaged upon the composition of his grandest work, the great poem of "Paradise Lost." Meanwhile troubles of another kind were gathering round his devoted head.

CROMWELL, THE MAN OF THE SWORD, AND MILTON, THE MAN OF THE PEN

While Oliver Cromwell had ruled with his firm hand, Milton was also a power in England. Cromwell was the embodiment of the vigour and force of his England, Milton the great thinker of the Commonwealth. For years they had worked together, the one doing, the other advising. So that when Cromwell died, and his weak son Richard succeeded him, only to let the country go over to the son of the slain King Charles, Milton, having written so much against the Stuart kings, had for a time to hide himself in the days of vengeance which marked the beginning of the Restoration. It says something for the friends of Charles II. that the great poet suffered no personal punishment for his writings against Royalty.

There is no period of the great poet's life one would rather dwell upon than those days when he was supposed to have sunk into obscurity, but was really making his name immortal, raising for himself a monument of fame that will outlast all others of his age. Deprived of his public office, and living in a humble house, though still above poverty, the poet's days were spent in dictating the majestic lines of "Paradise Lost."

HOW MILTON GOT 50 DOLLARS FOR THE GREATEST POEM OF MODERN TIMES

It was during the Great Plague of 1665 that he removed with his daughters to a cottage at Chalfont, in Buckinghamshire, which he owed to the kindness of a friend, where the greatest work of his poetic genius was finished. In 1666, the year of the Great Fire, Milton got a London bookseller to print "Paradise Lost," and received in all 50 dollars when 1,300 copies of it had been sold.

He had still many admiring readers, though he received so little for his writings; but amid the gaieties of the Cavaliers, who now ruled England under Charles II., Milton's splendid poem could not be expected to touch the mind of the whole country as it would have done had it appeared in the sober days when Cromwell ruled, and the poet was admired as the greatest thinker in the land. "Paradise Lost" is the noblest poem in the English language, and one of the grandest works of the modern world. It is founded on the Bible story of Adam and Eve, and how they came to be driven from the Garden of Eden. No description that can be given here could convey to the young reader any idea of the majestic grandeur of the poet's awe-inspiring pictures, the stately beauty of his verse, the dramatic fire and colour of certain scenes, the gentle pastoral beauty of others. It is one of the great treasures of our literature, which all of you should read when you grow a little older.

The next work of Milton's, after his great poem was a "History of Britain," appearing in 1670, and in the year after that he published two more poems.

THE LAST WORKS OF MILTON AND THE END OF HIS DAYS

"Paradise Regained" is a much shorter and not so fine a work as his great poem, though its subject is the more inspiring one of the Saviour triumphing over the temptation of Satan. "Samson Agonistes," the title of the other, is from the Greek, and it is not easy to give it in English, but we might translate its meaning as "Samson the Contestant." It is a short dramatic poem, describing the last days and deeds of the mighty Samson, who, deprived of his sight, could yet exert his giant strength to the destruction of the Philistine temple. It is really an expression of his own life and thought in his closing years; for the poet himself was something of a Samson all his life, and, not less after blindness had smitten him, was devoted to pulling down the temples of the false gods, his poetry being unmatched as a plea for righteousness, apart from the great soul-stirring books of the Bible.

The closing years of Milton's life were spent in the simplest fashion, and he had the companionship and devotion of his third wife, Elizabeth Minshull, whom he had married in 1663, to make up for the desertion of his undutiful daughters. He died on November 8, 1674, and was buried in the church of St. Giles, Cripplegate, London.

The next Men and Women begin on 3483.

WHAT THIS STORY TELLS US

WE have discussed the earth as a whole, and from many special points of view, and we have tried to dive down as deeply as possible—though that is not nearly deep enough—in order to find, far under our feet, the explanation for things that show upon the surface. But, before leaving this part of our subject, we must devote our attention to one particular part of the earth's surface which is, indeed, the most important of all—the soil, upon which living creatures depend for their food. We are all rooted in the soil, and without the soil not one of us could be alive. It is an absolute condition of the existence of thinking moral beings, like ourselves, that the very outside of the earth's crust shall be changed into this stuff we call the soil.

THE SOIL AND ITS USES

CONTINUED FROM 3332

THE more we know about our world, the more clearly does it look as if life were its great purpose. We are to think of the planet as a theatre, an arena, a mother, for life; and we have already seen that it is the life of the land, which breathes air, that reaches the highest. Now, when we examine into this life, we find that it all depends upon what happens at the very surface of the solid earth, where earth and air meet. We find, further, that the outer few inches of the earth's crust, or it may in some cases be a very few feet, become changed by the influence of air and water and light and life into something which we call soil.

We speak of soiling a thing, because the soil is rather messy, as if the soil were rather beneath our notice. But we know that animal life absolutely depends upon vegetable life for its existence, and we find that vegetable life depends upon the soil for its existence. So we may say that really everything that makes the existence of a planet worth while, that is to say, all the higher life which it nourishes, depends upon the processes which are ceaselessly going on just at the very outside of the earth's crust.

When we are in the country or at the seaside, we can see for ourselves what the soil means, because we can notice, for instance, at the top of a chalk cliff, or a rock cliff, a narrow layer which is evidently different from the rest; that layer is the soil. One may see it at the top of the chalk cliffs on the south coast of England, and if we study it there, we must understand that we are studying what goes on everywhere throughout the dry land of the earth, except in deserts, or where there is eternal snow and ice; and upon this process, which we can study so easily for ourselves, up to a point, is dependent the whole life of man.

If we look at the chalk cliff from the beach, we see that a few inches at the very surface, instead of being white, are brown; the chalk has been changed into soil by the process called "weathering." The brown colour is due to iron, which, as we know, is a necessary condition of all life everywhere. Often the rain trickling down the side of the rock will carry a little of the iron with it, and so we may see little brown streaks staining the white surface of the cliff. Upon the surface of these few inches of altered cliff green vegetable life grows. Even since we began to study the story of the earth, a great many interesting and important facts have been made known about the soil, and we are fortunate in being able to learn them now.

We know that every living creature requires nitrogen as part of its food; we know, also, that about four-fifths of the atmosphere consists of nitrogen, and so the surface of the soil, and anything growing there, are exposed to this gas. Also, we can readily understand that, as the soil is rather loose, there is a good deal of air in it, and this soil-air, as it is called, also consists mostly of nitrogen.

So we should suppose that an ordinary green plant of any kind gets the nitrogen that it always needs, from the air in which it is bathed. We know that the green plant feeds upon the carbonic acid in the air, and we might suppose that, as it must have nitrogen, it feeds upon the nitrogen too.

THE NITROGEN WITHOUT WHICH ANIMALS AND PLANTS CANNOT LIVE

Now, we ourselves, and the lower animals, require nitrogen; but it is found that, though it passes into our blood from the air, we do not use it, and anyone who does not get proteids, which contain nitrogen, in his food, will die of lack of nitrogen, even though his blood contains quantities of it. The reason is that he cannot use nitrogen except when it is combined with other things. Now, a very striking and unexpected fact was discovered about green plants several years ago; they are exactly like us in this respect. Carbonic acid gas they can feed upon, though we cannot; but neither they nor we can use the nitrogen gas of the air. This was proved by some Englishmen about fifty years ago. But it is perfectly certain that the plant must get nitrogen, and everyone who has to do with plants knows that they must be supplied in the soil with compounds of nitrogen. The interesting question is: How are these compounds obtained?

We know that when there is a flash of lightning, or, indeed, whenever there are electrical disturbances of any kind in the air, a certain amount of the nitrogen and oxygen of the air combines, and the compounds thus formed are largely carried down into the soil by the rain. So here is, at any rate, one source of combined nitrogen for the use of vegetable life, and it is a source which is in more or less constant action.

THE GREAT MYSTERY OF THE NITROGEN THAT IS FOUND IN THE SOIL

But everyone who grows plants knows well that for practical purposes this source cannot be counted upon at all. If he trusts to it alone, and there are no compounds of nitrogen in the soil to start with, his plants will not grow at all, and this, of course, is true of all the crops upon which mankind lives. Or, rather, to be exact, we should say that the plant grows until it has used up the compounds of nitrogen contained in the seed from which it started. When that is done, the plant simply stops growing. So, plainly, there must be some other source of compounds of nitrogen besides what the rain washes down into the soil from the air.

We know this, also, because in some parts of the world there are enormous quantities of compounds of nitrogen in the soil—quantities which cannot possibly be accounted for in this way. *Something else* happens in the soil, by means of which the free nitrogen of the air is made to combine with other elements, and so turned into compounds of nitrogen upon which the green plant can live. We say that the nitrogen is somehow "fixed," and this question of the fixation of the atmospheric nitrogen is one in which all the students of the soil are now deeply interested, and some wonderful things have been discovered.

HOW THE MICROBE AND THE PLANT GO INTO PARTNERSHIP

There is a certain kind of plants which has long been known to have a special power of growing and thriving even without a supply of those compounds of nitrogen which other plants need. The proper name for these is *leguminous* plants. They are so called because they form a thing called a legume; and we may know what that is because a pea-pod is a legume. Now, we find that the plants that produce pods like that—peas, beans, clovers, and vetches—behave as if they had the power of feeding on the nitrogen of the air. When we examine crops of this kind, we find that they contain far more nitrogen than can be accounted for unless the air has been drawn upon.

The men who began to study these plants found that they have tiny little swellings at various places on their roots, and that if they have not these swellings, they behave just like other plants, and cannot use the nitrogen of the air. Further, these swellings are only found on the roots of plants which have been infected by a little soil. If the plants are grown in sand, and no soil is allowed to get near them, no swellings appear on their roots, and they cannot grow unless compounds of nitrogen are supplied to them. There is, then, something in the soil which makes these swellings, and which gives the plant the power of using the nitrogen of the air.

It was next found that these swellings are filled with microbes of a special kind. A sort of partnership springs up between the leguminous plant and the microbe, and this is only one instance of several that we know in which two different kinds of living things make an arrangement of this kind between themselves. The pea or bean, or whatever it is, supplies the microbes with sugar and starch, which microbes, not being green, cannot make for themselves, but which they find very useful. On the other hand, the microbes have the extraordinary power which no green plant has, of fixing the nitrogen of the air—that is to say, combining it with other elements. The compounds of nitrogen thus formed are handed over to the leguminous plant, which thus gets on just as well as if a rich supply of nitrates were being poured into the soil. So it was proved that microbes could fix nitrogen, but all attempts to make these microbes do the same for other kinds of plants, as, for instance, for wheat, failed completely. The arrangement will only work between these microbes and leguminous plants.

THE ENERGY THAT THE NITROGEN GIVES TO THE PLANT

Plainly, there was much more to be discovered, and that has now been done. The probability was that as there were microbes which could fix the nitrogen of the air, we should find other microbes, perhaps living free in the soil, which could also fix nitrogen, and could thus supply compounds of nitrogen for the life of green plants in general, trees and grasses, including cereals.

Now, there is a very important point which we must understand here. When we take nitrogen, and combine it with anything, power or energy is stored up, as we say; in other words, there is more energy in the compounds of nitrogen than there is in nitrogen itself. This energy is, of course, wanted and used by the green plant. But nothing comes from nothing. If we make compounds of nitrogen in the chemical laboratory, we know that, according to the quantity we make, so we must spend a certain quantity of electricity or heat; just as when compounds are naturally made in the air by electricity. Now, though life is a miracle and can do marvellous things, it can neither create nor destroy energy. It is a transformer, but not a creator. If a microbe makes a compound of nitrogen, it has to get from somewhere the power to do so, just as the chemist must when he does the same thing.

HOW THE MICROBES FEED THE PLANTS WITH NITROGEN COMPOUNDS

This means, indeed, that if the microbe is to make compounds of nitrogen, it must be supplied in its food with power which it can put into them. In the case of the microbes that live on the roots of leguminous plants, the power comes from those plants; that is part of the bargain between them, and it comes mainly in the form of things like sugar and starch. These things contain power, for they make us strong, and when they are supplied to the microbe, it puts the power of them into the compounds of nitrogen which it makes.

But, now, this is very serious, for the green plant requires nitrates, but the microbe requires the help of the green plant before it can make the nitrates. The first question we must ask is: Where does the energy come from, in the first place? There is no difficulty about the answer. The energy comes from the sun. It is the power of sunlight that is stored up in the sugar made by the plant. It is that power which the microbe takes and puts into the nitrates it makes. Now, in certain parts of the world, we find soils which contain a very huge quantity of nitrates. In Russia, in Manitoba, and in the Argentine, we find these rich soils, which are, of course, the joy of the farmer, and which grow the most magnificent wheat. Huge weights of nitrates are contained in every acre of these soils, and the soil is feet thick.

HOW THE POWER OF THE MICROBES COMES FIRST OF ALL FROM THE SUN

We are certain that these nitrogen compounds have been made by microbes; not the same as those which live on the roots of leguminous plants, but others. But the law that all power must be accounted for has to be reckoned with. Where has the power come from which the microbes have used? It has come from the sun by means of the green plant. The whole meaning and explanation of these wonderful soils is that, for a long time past, natural vegetation has been growing

upon them, catching the power from the sun and turning it into substances which fall into the soil, and feed the microbes, and so enable them to fix the nitrogen of the air. At an agricultural college, where men are teaching the world some of these great facts about the soil, they have carefully compared the soil on two pieces of land, side by side.

How the earth saves up the riches of the sun

One of these has been cultivated in the usual way, and each year the crops, whatever they were, have been taken away by man and used. The other piece of land has been purposely left absolutely alone for a period of twenty-five years; it has been allowed to run wild, and it is now a bit of prairie land. The soil was carefully examined twenty-five years ago, and the amount of nitrates it contained was known. It is now found that the piece of land which has been cultivated contains no more nitrates than it did, and that the piece which has run wild has been collecting huge quantities of nitrates. Year after year the green plant has been growing. Its starch and sugar, instead of being carried away by the harvest-maker, have fallen back to the soil, and have fed the microbes which fix nitrogen.

We have quite lately discovered this very microbe, which is probably more important than all others in the world. It has rather a long name—*azotobacter*. This really means the bacterium, or microbe, that has to do with azote, and that is an old name for nitrogen. At this college they have lately examined soils from every part of the world, from Siberia, Australia, Canada, and so on, and everywhere, without exception, this microbe is found in the soil. It is a rather large, round microbe, but there is nothing about its appearance to tell us what its power is. If we could see into the heart of its life, we should find it to be a marvellous transformer of power.

A wonderful microbe that is like a furnace and burns up sugar

It is like a furnace. It will burn up sugar and starch at a tremendous rate, and as it burns them up, it makes compounds of nitrogen. All over the world the growth of the green plant, upon which our lives depend, depends upon the exquisite balance of duty that obtains between the green plant, which can feed upon the carbonic acid of the air but not on the nitrogen, and this microbe, which can feed on the nitrogen, if the green plant will supply it with the products of its feeding. Indeed, what it means is this: that the astonishing discovery made about leguminous plants really applies to all green plants. The leguminous plants have a special arrangement of their own, and the special microbes with which they are in partnership actually live inside their roots. But what is true of them is true in essentials of plants in general, though the azotobacter and its relatives find it equally convenient to live free in the soil instead of housing themselves in the green plant's roots.

It is a necessary condition for the existence of the azotobacter that the soil be not acid. Here and there we can find soils which have turned acid because something or other has made or put acid substances into them. In such soils the azotobacter cannot live, and, as a consequence, we find that these soils are infertile. Sometimes we are ourselves to blame for this, for we add to the soil various substances meant to do it good, which, nevertheless, are got hold of by microbes, and turned into acids.

The millions of useful microbes that live in the soil

Instead of doing the soil good by this treatment, we destroy the azotobacter, and then things will not grow in it. We are now beginning to get an idea of the complicated character of the soil. Words cannot describe how crowded it is with microbes of all kinds. The surface of the soil is always receiving additions of matter from previous life, leaves, and stalks, and so on. Then there are animal remains, and so on, added to it, not to mention the manures which are added to it on purpose. All these things, as they pass into the soil, are rapidly changed, and it is very easy to prove that these changes are all due to microbes. If we take some soil, and heat it so as to kill the microbes in it, all these changes stop; or if we add to the soil something which kills microbes, such as chloroform, then also these changes stop. That, of course, is the last thing that we wish to happen, but most of these changes which go on in the soil serve to prepare the food for the green plant. As we already know, the

very leaves which it sheds in the autumn are turned into new food for it in the spring, if the microbes are allowed to do their work.

Now, the ordinary chemistry of the soil is, of course, very important. We have already seen how tremendously important is the difference between an acid and an alkaline soil, and so it is very important that we shall add to the soil, in certain cases, certain chemical substances, such as nitrates and carbonates, and salts of ammonia. Often, however, we may do more harm than good if what we add upsets the balance of power amongst the microbes in the soil, and we are more and more learning that it is really the living microbes, and not the lifeless chemicals, that decide what the result shall be. And so the question arises whether our new knowledge of the soil may not help us to feed it with microbes of the kind we want, and so to get even more success than by feeding it with any chemicals at all.

LAZY MICROBES THAT WOULD NOT WORK FOR THEIR LIVING

Students of the subject began by getting hold of the microbes which they found on the roots of leguminous plants. They managed to grow them by themselves, just as the microbes of consumption, and so forth, can be grown. And then they thought to apply these growths to the soil. They failed at first because the microbes, having been too well fed in the laboratory, had turned lazy, and simply would not work when they were put back into the soil. This is just one more instance of the universal truth which applies to every living thing and every part of it. Instead of having to work for their living, the microbes had been fed in little glass tubes with all sorts of nice things, which no doubt made them feel very fat, and plump, and comfortable, but made them useless, like all persons who are over-fed without having to work. However, that difficulty was got over; but even then it was found that either one kind or another of desirable microbes is *already* present everywhere in the soil.

A great many people believe that this feeding of the soil with living microbes is very useful; but, on the other hand, many other people are not yet sure that this has really been proved. Time will show, and, at any rate, there is little doubt that if we cannot yet do what we desire, we shall be able to do so soon. Now, there is a most important matter which we must insist on. When we use up coal, or so-called mineral oil, we are really using up the great capital of wealth which has been accumulated—saved up from the sunlight of past ages, by the plants which were then alive.

HOW THE SUNSHINE OF THE PAST FEEDS THE CORN-LANDS OF TO-DAY

And now we learn that in the new countries where we are growing crops to feed our ever-increasing millions, mankind is also living upon its capital. It is true that, in the great wheat-lands of Manitoba, for instance, the capital may be enormous, but it is not endless. The green fields of corn which cover such a great part of the earth to-day are, of course, using the sunlight of the present. We know that they could not grow without that. But if that were all they had to draw upon, they could not grow as they do. In the main, they are living upon the sunlight of the past, just as much as if we had to feed them upon coal, as we have to feed machines, which are not alive.

We have learnt that the wealth of the soil upon which these plants grow has gathered there, and has been transformed by the azotobacter from the sugar and starch which past green plants have made from the sunlight. The soils which are wealthy now are the soils which have saved before now, like the soil of the land which was left alone for a quarter of a century at the college, and which became rich because men did not come and take away from it the wealth it made from year to year. People are looking to science to help them in this matter, that is, if they think about it at all.

SOMETHING THAT NEITHER NATURE NOR SCIENCE CAN DO

They think that when the coal is exhausted, or when the rich soils are exhausted, science will supply something else. Now, science can do wonderful things, but it cannot make something out of nothing, for the very good reason that not even Nature can make something out of nothing. Science may learn how to use to its best all the sunlight that falls upon the earth at the present. But when we have used up the sunlight of the past, as we are now doing, that is

Magnificent harvests of rich wheat are reaped in lands like Manitoba, where for centuries the soil lay unused.

all mankind will have to live upon, for we cannot borrow the sunlight of the future. These are great questions which thoughtful people must begin to think about unless posterity is to turn upon us, and call our age the age of blind waste.

After this we must go on to another part of the STORY OF THE EARTH. We have already a good idea of what the earth is, and we have studied some of the other worlds in space in order to learn more about the world we live on. We have learnt also about the different kinds of elements that make up the earth, and the sun, and the stars, and the way in which those elements combine with each other. If we are to use big words, then we can say that we have studied geology and astronomy and chemistry and geography—not the geography which deals with frontiers and cities, but natural geography; and, lastly, we have even studied agriculture. There still remains a very important and very big study, the special name of which is physics—a name derived from the Greek word for Nature.

By physics we now mean the study of motion and heat, light, sound, and electricity. Of course, there is no real division between physics and chemistry, for instance, and we cannot understand the one without the other. Nature is not made in watertight compartments, though I am afraid we often talk and think as if she were, and as if our minds were. It is only for convenience, and because we cannot see everything at once, that we have to study one thing at a time. So next we shall go on to study motion, which is very much more interesting than perhaps we at present think.

The next part of this is on page 3465.

The great harvests in Canada are due to unused nitrates that have for centuries been accumulating in the soil.

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A FAMOUS POEM BY MATTHEW ARNOLD

MATTHEW ARNOLD, if not in the very first rank of English poets, is still to be regarded as one of the greater of the modern writers. In his character he reminds us somewhat of Charles Kingsley, as a lover of all that was manly, pure, and of good repute. He wrote many books, but chiefly in the realm of criticism, on which his fame is largely founded, although there are some who think his beautiful and inspiring poems will outlast his brilliant criticisms of literature and religion. The eldest son of Dr. Arnold, of Rugby, one of England's most famous schoolmasters, he was born on December 24, 1822, and died on April 15, 1888. Most of his active life was spent as an inspector of schools, but for ten years he was also Professor of Poetry at Oxford. The poem we give here is one of his most delicate and fanciful pieces, and, although it is addressed to children, it will charm and engage us long after our childhood days are past.

THE FORSAKEN MERMAN

CONTINUED FROM 3277

COME, dear children, let us away;
Down and away below.
Now, my brothers, call from the bay;
Now the great winds shoreward blow;
Now the salt tides seaward flow;
Now the wild white horses play,
Champ and chafe, and toss in the spray.
Children, dear, let us away.
This way, this way!

Call her once before you go.
Call her once yet.
In a voice that she will know:
"Margaret! Margaret!"
Children's voices should be dear
(Call once more) to a mother's ear;
Children's voices, wild with pain.
Surely she will come again.
Call her once and come away,
This way, this way!
"Mother, dear, we cannot stay."
The wild white horses foam and fret.
Margaret! Margaret!

Come, dear children, come away down.
Call no more.
One last look at the white-walled town,
And the little grey church on the windy shore
Then come down.
She will not come though you call all day.
Come away, come away.

Children, dear, was it yesterday
We heard the sweet bells over the bay?
In the caverns where we lay,
Through the surf and through the swell,
The far-off sound of a silver bell?
Sand-strewn caverns, cool and deep,
Where the winds are all asleep;
Where the spent lights quiver and gleam;
Where the salt weed sways in the stream;
Where the sea-beasts, ranged all round,
Feed in the ooze of their pasture-ground;
Where the sea-snakes coil and twine,
Dry their mail, and bask in the brine;
Where great whales come sailing by,
Sail and sail, with unshut eye,
Round the world for ever and aye?
When did music come this way?
Children, dear, was it yesterday?

Children, dear, was it yesterday
(Call yet once) that she went away?
Once she sat with you and me,
On a red gold throne in the heart of the sea,
And the youngest sat on her knee.
She combed its bright hair, and she tended it well,
When down swung the sound of the far-off bell.
She sighed, she looked up through the clear green sea.
She said: "I must go, for my kinsfolk pray
In the little grey church on the shore to-day.
'Twill be Easter-time in the world—ah, me!
And I lose my poor soul, Merman, here with thee."
I said: "Go up, dear heart, through the waves.
Say thy prayer, and come back to the kind sea-caves."
She smiled, she went up through the surf in the bay.
Children, dear, was it yesterday?

Children, dear, were we long alone?
"The sea grows stormy, the little ones moan.
Long prayers," I said, "in the world they say.
Come," I said, and we rose through the surf in the bay.
We went up the beach, by the sandy down
Where the sea-stocks bloom, to the white-walled town.
Through the narrow, paved streets, where all was still,
To the little grey church in the windy hill.
From the church came a murmur of folk at their prayers,
But we stood without in the cold-blowing airs.
We climbed on the graves, on the stones worn with rains,
And we gazed up the aisle through the small leaded panes.
She sate by the pillar; we saw her clear;
"Margaret, hist! Come quick, we are here.
Dear heart," I said, "we are long alone.
The sea grows stormy, the little ones moan."
But, ah! she gave me never a look,
For her eyes were sealed to the holy book.
Loud prays the priest; shut stands the door.
Come away, children, call no more.
Come away, come down, call no more.

Down, down, down ;
Down to the depths of the sea.
She sits at her wheel in the humming town,
Singing most joyfully.
Hark what she sings : " O joy, O joy,
For the humming street, and the child with its toy,
For the priest, and the bell, and the holy well,
For the wheel where I spun,
And the blessed light of the sun."
And so she sings her fill,
Singing most joyfully,
Till the shuttle falls from her hand,
And the whizzing wheel stands still.

She steals to the window, and looks at the sand ;
And over the sand at the sea ;
And her eyes are set in a stare,
And anon there breaks a sigh,
And anon there drops a tear,
From sorrow-clouded eye,
And a heart sorrow-laden,
A long, long sigh,
For the cold, strange eyes of a little Mermaiden,
And the gleam of her golden hair.

Come away, away children,
Come children, come down ;
The hoarse wind blows colder ;
Lights shine in the town.
She will start from her slumber
When gusts shake the door ;
She will hear the winds howling,
Will hear the waves roar.
We shall see while above us
The waves roar and whirl,
A ceiling of amber,
A pavement of pearl.
Singing : " Here came a mortal,
But faithless was she ;
And alone dwell for ever
The kings of the sea."

But, children, at midnight,
When soft the winds blow ;
When clear falls the moonlight,
When spring-tides are low ;
When sweet airs come seaward
From heaths starred with broom,
And high rocks throw mildly
On the blanched sands a gloom ;
Up the still, glistening beaches,
Up the creeks we will hie ;
Over banks of bright seaweed
The ebb-tide leaves dry.
We will gaze from the sand-hills
At the white, sleeping town,
At the church on the hillside—
And then come back down.
Singing : " There dwells a loved one,
But cruel is she ;
She left lonely for ever
The kings of the sea."

CHERRY RIPE

This little lyric in praise of " Julia's " smiling lips was written by Robert Herrick, who was born in 1591, and died in 1674.

CHERRY ripe, ripe, ripe, I cry,
Full and fair ones—come and buy ;
If so be you ask me where
They do grow—I answer, There,
Where my Julia's lips do smile—
There's the land, or cherry-isle ;
Whose plantations fully show
All the year where cherries grow.

THERE'S ROOM AT THE TOP

" There's Room at the Top " was written by Mrs. Lilla T. Elder, an American poet. Mrs. Elder, who had children of her own, so thoroughly understood child nature that her verses cannot fail to be a source of delight to boys and girls of all ages. Several of her most charming poems will be found in different parts of the " Child's Book of Poetry."

THE hill of success may be steep, boys,
And hard work it may be to climb,
But the way grows smooth towards the top,
And it's only one step at a time. [boys ;

Be sure you are honestly shod, boys ;
Take the staff of self-help in your hand,
Watch out for the rough, rocky tread, boys,
And trust not to gravel or sand.

Look not far up into the clouds, boys,
Nor yet on the valley below,
But steadfastly, patiently, climb, boys,
Each step of the way learn to know.

Respect well the right of road, boys,
Let others more swift pass you by,
And fail not to hold out a hand, boys,
To all those who stumble and sigh.

There's plenty of room at the top, boys,
Though crowded the pathway and long,
And no one need fail in the end, boys,
If he's honest and patient and strong.

MY OLD KENTUCKY HOME, GOOD-NIGHT

This dear old folk-song of the South is well known throughout our broad land, and its author, Stephen Collins Foster, has written many such poems, whose homely sentiment has found for them a place in our hearts.

THE sun shines bright in the old Kentucky home ;
'Tis summer, the darkeys are gay ;
The corn-tops ripe, and the meadow's in the bloom,
While the birds make music all the day.
The young folks roll on the little cabin floor,
All merry, all happy and bright ; [door ;
By-'n-by hard time comes a-knocking at the
Then my old Kentucky home, good-night.
Weep no more, my lady,
O, weep no more to-day,
We will sing one song for the old Kentucky home,
For the old Kentucky home, far away,

They hunt no more for the 'possum and the coon,
On the meadow, the hill and the shore ;
They sing no more by the glimmer of the
On the bench by the old cabin door. [moon,
The day goes by like a shadow o'er the heart,
With sorrow, where all was delight ;
The time has come when the darkeys have to part :
Then my old Kentucky home, good-night.
The head must bow, and the back will have to bend,
Wherever the darkey may go ;
A few more days, and the trouble all will end
In the field where the sugar-canes grow.
A few more days for to tote the weary load :
No matter, 't will never be light ;
A few more days till we totter on the road :
Then my old Kentucky home, good-night.
Weep no more, my lady,
O, weep no more to-day ;
We will sing one song for the old Kentucky home,
For the old Kentucky home, far away.

IF WE HAD BUT A DAY

"If We Had But a Day" was written by Mary Lowe Dickinson. How many of us have ever thought before how we would spend the time if we had but one day in which to live?

We should fill the hours with the sweetest
If we had but a day; [things,
We should drink alone at the purest springs
In our upward way;
We should love with a lifetime's love in an
If the hours were few; [hour
We should rest, not for dreams, but for fresher
To be and to do. [power

We should waste no moments in weak regret
If the day were but one;
If what we remember and what we forget
Went out with the sun;
We should be from our clamorous selves set
To work or to pray, [free
And to be what the Father would have us be,
If we had but one day.

SHE WALKS IN BEAUTY

Lord Byron, in this exquisite poem, has given us one of the most beautiful descriptions of a beautiful woman that has ever been written.

She walks in beauty like the night
Of cloudless climes and starry skies,
And all that's best of dark and bright
Meet in her aspect and her eyes;
Thus mellow'd to that tender light
Which heaven to gaudy day denies.

One shade the more, one ray the less,
Had half impaired the nameless grace
Which waves in every raven tress
Or softly lightens o'er her face,
Where thoughts serenely sweet express
How pure, how dear their dwelling-place.

And on that cheek, and o'er that brow
So soft, so calm, yet eloquent.
The smiles that win, the tints that glow,
But tell of days in goodness spent—
A mind at peace with all below,
A heart whose love is innocent.

SHE WAS A PHANTOM OF DELIGHT

Contrast these lines by William Wordsworth with those by Lord Byron. Both treat of the same subject, a lovely woman, and yet note how differently each poet approaches his theme.

She was a phantom of delight
When first she gleam'd upon my sight;
A lovely apparition sent
To be a moment's ornament;
Her eyes as stars of twilight fair;
Like twilight's, too, her dusky hair;
But all things else about her drawn
From May-time and the cheerful dawn;
A dancing shape, an image gay,
To haunt, to startle, and waylay.

I saw her upon nearer view,
A spirit, yet a woman, too.
Her household motions light and free,
And steps of virgin liberty;
A countenance in which did meet
Sweet records, promises as sweet;
A creature not too bright or good
For human nature's daily food,
For transient sorrows, simple wiles,
Praise, blame, love, kisses, tears, and smiles.

And now I see with eye serene
The very pulse of the machine;
A being breathing thoughtful breath,
A traveller between life and death;
The reason firm, the temperate will,
Endurance, foresight, strength, and skill;
A perfect woman, nobly plann'd
To warn, to comfort, and command;
And yet a spirit still, and bright,
With something of an angel light.

WILLIAM THE CONQUEROR

Charles Mackay, in these verses on William the Conqueror, seeks to illustrate for us that side of a great warrior's life which the historians too often neglect. We are not to suppose that William the Conqueror thought what the poet here suggests, but we know that with all his conquests he was not contented, and that probably some of the poor Saxon peasants whom he despised were happier in their quiet, dull lives than he.

Great King William spread before him
All his stores of wealth untold—
Diamonds, emeralds, and rubies,
Heaps on heaps of minted gold.
Mournfully he gazed upon it
As it glittered in the sun,
Sighing to himself, "Oh, treasure,
Held in care, by sorrow won!
Millions think me rich and happy;
But, alas! before me piled
I would give thee ten times over
For the slumbers of a child."

Great King William from his turret
Heard the martial trumpets blow;
Saw the crimson banners floating
Of a countless host below;
Saw their weapons flash in sunlight,
As the squadrons trod the sward;
And he sighed, "Oh, mighty army,
Hear thy miserable lord:
At my word thy legions gather,
At my nod thy captains bend;
But with all thy power and splendour,
I would give thee for a friend!"

Great King William stood on Windsor,
Looking from its castled height
O'er his widespread realm of England
Glittering in the morning light;
Looking on the tranquil river
And the forest waving free;
And he sighed: "Oh, land of beauty,
Fondled by the circling sea,
Mine thou art, but I would yield thee
And be happy could I gain,
In exchange, a peasant's garden,
And a conscience free from stain."

THE BUGLE

This beautiful poem by Lord Alfred Tennyson is taken from "The Princess." The rhythm so perfectly expresses the dying of the echoes into the distance, that we can almost hear them as they grow gradually fainter and fainter until all is quiet.

The splendour falls on castle walls
And snowy summits old in story:
The long light shakes across the lakes
And the wild cataract leaps in glory.
Blow, bugle, blow, set the wild echoes flying,
Blow, bugle; answer, echoes, dying, dying,
dying.

Oh, hark! Oh, hear! How thin and clear,
And thinner, clearer, farther going!
O sweet and far, from cliff and scar,
The horns of Elfland faintly blowing!
Blow, let us hear the purple glens replying:
Blow, bugle; answer, echoes, dying, dying,
O love, they die in yon rich sky, [dying.
They faint in hill or field or river;
Our echoes roll from soul to soul,
And grow for ever and for ever.
Blow, bugle, blow, set the wild echoes flying,
And answer echoes, answer, dying, dying,
dying.

THE FAIRY TEMPTER

Samuel Lover, the Irish poet and novelist, is the author of this charming fairy poem. It is a beautiful fancy, with a lesson for all of us—not to be tempted by fair promises from the path of duty, which is always plain if not always inviting.

A FAIR girl was sitting in the greenwood shade,
List'ning to the music the spring birds made;
When sweeter by far than the birds on the tree
A voice murmured near her: "Oh, come, love, with me—
In earth or air,
A thing so fair
I have not seen as thee!
Then come, love, with me."

"With a star for thy home, in a palace of light,
Thou wilt add a fresh grace to the beauty of night;
Or, if wealth be thy wish, thine are treasures untold,
I will show thee the birthplace of jewels and gold—
And pearly caves
Beneath the waves—
All these, all these are thine,
If thou wilt be mine."

Thus whispered a fairy to tempt the fair girl,
But vain was the promise of gold and of pearl;
For she said: "Tho' thy gifts to a poor girl were dear,
My father, my mother, my sisters are here—
Oh, what would be
Thy gifts to me
Of earth, and sea, and air
If my heart were not there?"

THE MOTHER TO HER INFANT

We have already read a number of short pieces by Thomas Miller on the sights and sounds of natural life. In the following his theme is taken from human nature, and he touches a familiar domestic subject with real feeling.

SLUMBER, my darling, no danger is near,
Thy mother sits by thee to guard thy repose;
Though the wind roars aloud, not a breath reaches here,
To shake the white curtains which round thee do close:
Then slumber, my darling, and sleep without fear,
Thou art safe from all danger, my dearest, while here.

What is it the angels do unto thee say,
When thou dost lie smiling so sweet in thy sleep?
Are they trying, my sweetest, to lure thee away,
And leave me alone in my sorrow to weep?
Oh, sometimes I fancy they whisper thy name,
And would fain bear thee back to the land whence they came.

Then never, my darling, when thou growest old,
Forget her who on thy sweet infancy smiled,
To whom thou wert dearer than jewels and gold,
Who studied thy looks and thy wishes, my child,
Who, when thou didst need her, was never away,
In health or in sickness, by night or by day.

THE SNOW-STORM

ANNOUNCED by all the trumpets of the sky,
Arrives the snow, and, driving o'er the fields,
Seems nowhere to alight: the whited air
Hides hills and woods, the river, and the heav'n,
And veils the farm-house at the garden's end.
The sled and traveller stopped, the courier's feet
Delayed, all friends shut out, the housemates sit
Around the radiant fireplace, enclosed
In a tumultuous privacy of storm.

Come see the north wind's masonry.
Out of an unseen quarry evermore
Furnished with tile, the fierce artificer
Curves his white bastions with projected roof
Round every windward stake, or tree, or door.
Speeding, the myriad-handed, his wild work
So fanciful, so savage, naught cares he
For number or proportion. Mockingly,
On coop or kennel he hangs Parian wreaths;
A swan-like form invests the hidden thorn;
Fills up the farmer's lane from wall to wall,
Maugre the farmer's sighs; and at the gate
A tapering turret overtops the work.
And when his hours are numbered, and the world
Is all his own, retiring as he were not,
Leaves, when the sun appears, astonished Art
To mimic in slow structures, stone by stone,
Built in an age, the mad wind's night-work,
The frolic architecture of the snow.

—RALPH WALDO EMERSON.

YOUNG AND OLD

Charles Kingsley in these oft-quoted verses sets down a whole lifetime of experience. By the quick contrast of the gay days of youth and the grey days of later life he conveys a feeling no amount of prose writing could express.

WHEN all the world is young, lad,
And all the trees are green;
And every goose a swan, lad,
And every lass a queen;
Then hey for boot and horse, lad,
And round the world away;
Young blood must have its course, lad,
And every dog his day.

When all the world is old, lad,
And all the trees are brown;
And all the sport is stale, lad,
And all the wheels run down;
Creep home, and take your place there,
The spent and maimed among;
God grant you find one face there
You loved when all was young.

SOUND LOUD THE CLARION

These four lines of verse by the great Sir Walter Scott are frequently quoted and well worth committing to memory.

SOUND, sound the clarion, fill the fife!
To all the sensual world proclaim,
One crowded hour of glorious life
Is worth an age without a name.

LITTLE VERSES FOR VERY LITTLE PEOPLE

AWAY, birds, away!
Take a little, and leave a little,
And do not come again;
For if you do,
I will shoot you through,
And there is an end of you.

OH, ring the bells! Oh, ring the bells!
We bid you, sirs, good-morning;
Give thanks, we pray—our flowers are gay,
And fair for your adorning.

Oh, ring the bells! Oh, ring the bells!
Good sirs, accept our greeting;
Where we have been, the woods are green,
So, hey, for our next meeting.

Then ring the bells! Then ring the bells!
For this fair time of Maying;
Our blooms we bring, and while we sing,
Oh, hark to what we're saying.

Oh, ring the bells! Oh, ring the bells!
We'll sing a song with any;
And may each year bring *you* good cheer,
And each of *us* a penny.

"SHALL I sing?" says the Lark,
"Shall I bloom?" says the Flower;
"Shall I come?" says the Sun,
"Or shall I?" says the Shower.

Sing your song, pretty Bird,
Roses, bloom for an hour;
Shine on, dearest Sun,
Go away, naughty Shower.

"BARBER, barber, shave a pig,
How many hairs will make a wig?"
"Four and twenty, that's enough."
Give the barber a pinch of snuff.

HERE'S Sulky Sue;
What shall we do?
Turn her face to the wall
Till she comes to.

"How do you do, neighbour?
Neighbour, how do you do?"
"Very well, I thank you.
How does Cousin Sue do?"
"She is very well,
And sends her love to you,
And so does Cousin Bell."
"Ah! how, pray, does she do?"

"BILLY, Billy, come and play,
While the sun shines bright as day."
"Yes, my Polly, so I will,
For I love to please you still."
"Billy, Billy, have you seen
Sam and Betsy on the green?"
"Yes, my Poll, I saw them pass,
Skipping o'er the new-mown grass."
"Billy, Billy, come along,
And I will sing a pretty song."
"Oh, then, Polly, I'll make haste,
Not one moment will I waste,
But will come and hear you sing,
And my fiddle I will bring."

DAME TROT and her cat
Sat down for to chat;
The Dame sat on this side,
And Puss sat on that.

"Puss," says the Dame,
"Can you catch a rat
Or a mouse in the dark?"
"Purr," says the cat.

"BUY me a milking-pail,
Mother, mother."
"Betsy's gone a-milking,
Beautiful daughter."

"Sell my father's feather bed,
Mother, mother."
"Where will your father lie,
Beautiful daughter?"

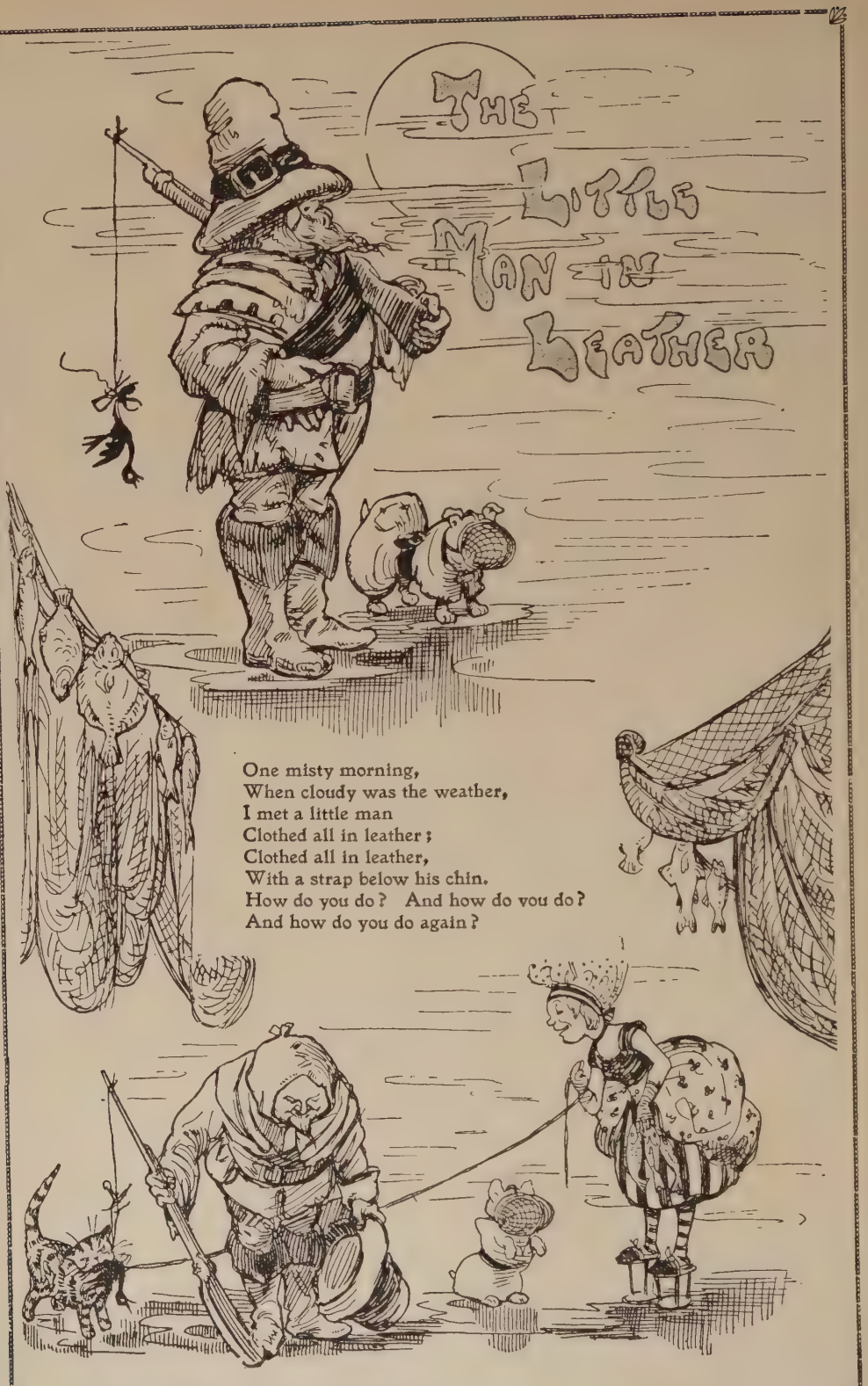
"Put him in the boys' bed,
Mother, mother."
"Where will the boys lie,
Beautiful daughter?"

"Put them in the pigs' sty,
Mother, mother."
"Where will the pigs lie,
Beautiful daughter?"

"Put them in the salting-tub,
Mother, mother.
Put them in the salting-tub,
Mother, mother."

THE robin and the red-breast,
The robin and the wren;
If ye take from their nest,
Ye'll never thrive again!

The robin and the red-breast,
The martin and the swallow;
If ye touch one of their eggs,
Bad luck will surely follow.



One misty morning,
When cloudy was the weather,
I met a little man
Clothed all in leather;
Clothed all in leather,
With a strap below his chin.
How do you do? And how do you do?
And how do you do again?

An everyday scene in one of the sunny streets of the great Spanish seaport of Barcelona

SPAIN AND PORTUGAL

CONTINUED FROM 3226

ONE of the oldest fairy stories in the world tells us about the travels and deeds of a certain strong and daring giant, on his way from end to end of the Mediterranean Sea. The story was an old one when Greek children listened to it over 2,000 years ago. With the shining blue sea dancing before their eyes, it was easy for them to follow the hero, in imagination, to its very farthest end, where Africa and Europe nearly meet. For here, so the story says, to show how far he had gone, the mighty Hercules raised two huge rocks called " the Pillars of Hercules," and they stand to this day, one on each side of the narrow straits, just nine miles across, where the sea joins the ocean.

The far-famed rock on the European side, over 1,000 feet high, stands like a guard near the extreme south point of the Iberian Peninsula.

This great mass of land, now comprising the large kingdom of Spain, and the smaller one of Portugal is, roughly speaking, about 500 miles square, and it lies on the south-west corner of Europe between the Mediterranean and the Atlantic; the grand and rugged Pyrenees form its only land frontier. It has been said that Europe ends at the Pyrenees, so different in many ways is the country beyond them from the rest of the Continent. It is true that its Mediterranean shores, in their beauty and fertility, remind us of the shores of the other two southern peninsulas; and the coasts of the Atlantic and the Bay of Biscay can be matched in the West of France and the British Isles. It is the centre, the inner part—that is to say, three-quarters of the whole Iberian Peninsula—that is more like Africa than Europe. This part is pushed up, as it were, some two to three thousand feet above the sea-level, and across this tableland or high plateau run several ranges of mountains, regular like the teeth of a saw, generally in an easterly and westerly direction, some thousands of feet higher still. Between these high ranges run most of the chief rivers draining to the Atlantic.

Bare, and bleak, and rugged, is most of this inland scenery, in strong contrast to the loveliness and warmth of that of the Mediterranean coast and of the three chief plains of the country. These plains lie in river valleys, one in that of the Ebro, which flows into the Mediterranean between the Pyrenees and the Iberian mountains; another in the valley of the

Guadalquiver, between the Sierra Nevada and the Sierra Morena; and the third is found along the western Atlantic shore, widening to the south between the lower courses of the Tagus and the Guadiana. The courses of these rivers of the plains present another contrast, for high up on the plateau where they rise, they flow, generally speaking, deep down in gorges, between rocky cliffs, useless for watering the land or for serving as routes.

The peninsula furnishes yet another sharp contrast in the matter of its rainfall. The lands bordering on the Bay of Biscay are the wettest in Europe; those on the central plateau are the driest, for the high Cantabrian mountains, the continuation of the Pyrenees along the coast, seize the moisture of the wet west winds—as our mountains do in the West—and the valleys of the deep northward slopes, falling 9,000 feet to the sea, are green and beautiful, growing many crops. Ferns and flowers abound, also all sorts of fruit-trees, ripening in the mild climate.

THE SUDDEN STORMS THAT SWEEP OVER THE SPANISH TABLELANDS

On the lofty tablelands on the other side of the mountains, which are only 2,000 feet below the peaks, the rain comes in occasional and sudden storms; so that at times the small rivers are dried up, while at other times the larger ones are apt to race unexpectedly down their rocky beds in swollen floods. Hot winds, too, blow at certain seasons over the plateau from Africa, and so we find scarcely any forests or crops upon it. Many sheep and goats of famous breeds feed upon the close pastures, shut in by the teeth-like mountainous walls so bare and rocky.

Round the straight coast of the Iberian Peninsula there is no fringe of lovely islands like those around the Balkan Peninsula; but we have the continuation of the range of the Sierra Nevada reappearing above the sea to the east as the Balearic Islands, often fought for by the surrounding peoples, though intended by Nature to belong to Spain. On them grow the same fruits and crops as flourish so well round the neighbouring coasts. The people who live to-day in the corner lands of the Bay of Biscay say proudly that they are of the oldest race in Europe. They are the descendants of the earliest known people in the peninsula, the Iberians, who have given their name to it. They have always been distinguished for their passionate love of independence during the changes that have occurred in the passing centuries.

THE OLD ROMAN CITIES THAT HAVE BECOME GREAT AND FAMOUS

The Romans were the conquerors of the Iberians and the Kelts, who came later and mixed with them, and many are the traces of their long stay in the land. Naturally, they settled much along the coast closest to Italy, and many of the cities famous to-day date from Roman times. There is Barcelona, with its beautiful clear air and fine climate; Saragossa, inland, is in the centre of the valley of the Ebro; Valencia, whose beauty has given rise to the saying: "You would take it for a piece of heaven upon earth." Toledo is on the Tagus, that "cuts out" its course on one of the Roman roads of the interior; and to the south, on the Guadalquiver, the "great river," rose up the splendid towns of Seville and Cordova. All these belonged to Hispania, whence we get the name Spain.

But it was in the province of Lusitania, formed round about the lower courses of the Douro, the Tagus, and the Guadiana, that Merida, the Rome of Spain, rose up in its grandeur. Here are still to be seen fine ruins of an amphitheatre, a circus, and an aqueduct, and to the north, over the wild rock-walled Tagus, is one of the grandest old bridges in the world. It is half as long again as Waterloo Bridge over the Thames, grey and stained with the weather of seventeen centuries. But the nation of soldiers and builders had to leave the fine roads and the camps, the cities and monuments of the peninsula, as they had to do in Britain and Gaul, when the empire began to grow weaker.

THE FIERCE TRIBES THAT POURED DOWN UPON SPAIN FROM THE NORTH

Hordes of German tribes, among them the Goths and Vandals, poured down from the north and took possession of nearly the whole of the peninsula. By degrees the Goths gave up their fierce religion for Christianity, and churches and monasteries rose up over the country as the people became more civilised. But with civilisation their character

seemed to grow weaker. There were many Gothic kings, some of whom held sway over the states that were forming, as the years went by, more or less on the lines of the Roman provinces.

Some of the states did not grow into shape till later on, though, broadly speaking, the provinces of to-day are survivals of the old states and kingdoms, and in most cases their great cities and towns were the old Roman capitals.

Catalonia, with its capital, Barcelona, Valencia and Murcia lie on the fertile east coast; and Andalusia, with its host of great towns, is on the south. These are the garden provinces of Spain, famous for flowers and palms, grapes and olives, oranges and lemons.

Portugal, on the lower Lusitanian Atlantic seaboard, stretches right up to Galicia in one broad strip. Cape Finisterre, the end of the Roman land, lies on the rocky coast of Galicia, sometimes called the Switzerland of Spain, and to the east of this land of independent spirited mountaineers lies Leon, named after the seventh Roman legion.

Old and New Castile are on the central plateau, and Aragon is in the upper valley of the Ebro, with Saragossa for its capital.

The rule of the Christian Gothic kings over most of these states came to a sudden and tragic end at the beginning of the eighth century. Over the sea from Africa came a great host, sailing under a crescent banner; their watchword was "God is great, and Mohammed is His prophet." They poured into the peninsula under the shadow of the great Pillar of Hercules, that we call Gibraltar now, from Gebel-Tarik, the Rock of Tarik, who was the leader of these Mohammedan Saracens or Moors. They landed in 711, and in the course of a few years the Moors spread nearly all over the peninsula, and on through the passes of the Pyrenees, over the fair plains of France as far as Tours. Here they were stopped by Charles of the Hammer, and the Mohammedan wave, which might have spread over Northern Europe, and even across the Channel, was turned back southwards by this victory, across the mountain barrier whence it had come. It was nearly 800

The Spanish Peninsula juts out into the Atlantic, the most westerly part of all Europe. At its southernmost point it nearly touches Africa, and the narrow Straits of Gibraltar are commanded by the great guns of an impregnable rock fortress. No other country in Europe has a finer soil and climate, and yet half Spain lies uncultivated.

years before the power of the Moors came to an end in the peninsula itself.

Many champions rose up, and great efforts were made through the centuries to dislodge the "Pagans," the "Infidels," as the Christians called the Moors, who were equally anxious to spread the worship of Mohammed by crushing out the Christians. We know how Charlemagne, grandson of Charles of the Hammer, came fighting to the rescue, and how his nephew Roland made a most heroic retreat through the gloomy pass in the Pyrenees. Later, the great national hero, the Cid, or Conqueror, performed surprising feats against the Moors, which, like those of Roland, are the subjects of many favourite stories. Some English Crusaders came, too, and found pleasure and adventure in helping on the struggle. But for a long time the Moors held their own. Besides being warlike and fearless in spreading their faith, they were industrious and clever. They understood how to use rivers to water and fertilise dry soil. They were splendid gardeners, and introduced all sorts of new trees and flowers.

THE WARLIKE MOORS, WHO MADE SPAIN A FAIRYLAND OF GARDENS AND PALACES

But, above all, they were wonderful builders. As we travel over the peninsula to-day, amongst the greatest marvels that we see are the remains of Moorish buildings; their palaces and mosques, and the fortresses and castles which were built across the central highlands, are amongst the wonders of the world.

The foothold for the eventual reconquering of the country by the Christians was on the north. From the highlands of the Pyrenees and the Cantabrian mountains, the Moors were driven first over the Ebro valley. Then the kingdoms of Leon, Castile, Aragon slowly extended their borders. We read, elsewhere, the story of the princess of Castile who married an English prince, and went with him to the Crusades. Next, Leon and Castile gained power by union, and the Moors had to retreat over the high plains and across Andalusia into the south. Their last province was Granada, which they held for another two centuries. During this time most of the Christian states were drawing closer together on their way to become one united Spanish kingdom. But Portugal stood alone. The Spanish and Portuguese people belong to much the same stock, and so do their languages. Geographically, there was no reason why this Atlantic province should remain distinct and independent when the others tended to unite. There is no natural division line between it and the rest of the peninsula.

HOW THE SEA CALLED THE PORTUGUESE TO CONQUEST AND DISCOVERY

Its mountains are the ends of the ranges of Spain; its chief rivers are the useful lower courses of the rivers of Spain. It had been overrun by the Germanic tribes like the rest of the peninsula, invaded by the Moors in the eighth century, reconquered from them by Castile, and it had been able, one hundred years later, to set up the first of its independent kings.

Half the Portuguese boundaries are the rolling waves of the Atlantic, and when the kingdom had settled down a little there were leisure and opportunity to listen to the insistent call of the sea, which is ever felt by those who dwell beside it; so they built ships fit for more than coast voyages. The story of how the Portuguese enlarged their borders over the neighbouring western islands and onwards, and how they showed the way to India round the Cape of Good Hope, we read elsewhere. Prince Henry, the Navigator, who did so much to encourage the explorers, was the grandson of an Englishwoman, Philippa of Gaunt, who was granddaughter of the old warrior Edward III. and his good queen, Philippa, whose story we read elsewhere.

Portuguese sailors also found their way to Brazil, where later rich mines of gold and diamonds brought great wealth to the little mother country. It was about this time that Lisbon, so beautifully situated on the fine harbour at the mouth of the Tagus, became one of the richest cities in Europe; and Oporto, another great harbour on the Douro, began to grow rich from trade with distant parts.

THE KING AND QUEEN WHO MADE SPAIN ONE COUNTRY

Spain was not slow in following Portugal to enterprising discoveries and conquests far beyond Europe. In the picture on another page we see the two sovereigns, Ferdinand of Aragon and

THE ENEMIES OF SPAIN IN RETREAT

For nearly 800 years the Moors ruled in Spain, but gradually they were pressed back, until at last, in 1492, their last stronghold, Granada, surrendered. Here we see King Ferdinand and Queen Isabella receiving the keys of the city from the last of the Moorish kings, who, as he looked back upon the towers he had left for ever, wept bitterly. The rock from which he took this final look is still known as "the Last Sigh of the Moor."

When Napoleon forced his brother Joseph upon the Spaniards as their king, they rose in revolt against the French army that had invaded their country. The English, under Wellington, went to the help of Spain, and the fierce Peninsular War was the result. After much fighting Wellington inflicted a crushing defeat upon the French at Vittoria, and the French left the town a mere flying mob, as shown in this picture by R. Hillingford. Joseph Bonaparte only just escaped, leaving his carriage and even his private papers behind.

Isabella of Castile, whose story is told on page 2367, listening to Columbus. It was the marriage of Ferdinand and Isabella that united their kingdoms, and made it possible to gather enough strength together to displace the Moors from Granada, and thus bring the Moorish dominion to an end.

What exciting times they were! Columbus was pleading so anxiously for help and men to cross the seas, and Isabella herself, dressed in armour, was in the midst of the army, while the siege of Granada was going on. The tent in which were the royal children was knocked over, and they nearly fell into the hands of the Moors. Little Catherine was there, who grew up to be the wife of Henry VIII., so familiar to us in English history as the dignified and unfortunate Catherine of Aragon. In later years, when sad and ill in a damp, grey country, how often must Catherine have thought of the bright home of her childhood, with its sunshine and white-crested mountains. In the cathedral of Granada are still to be seen pictures, statues, and personal belongings illustrating those years, and amongst them is a banner worked by Isabella, which was hoisted over the conquered city when the Moors left.

THE FAIRY PALACE ON A HILL, WHOSE WALLS ARE LIKE LACE

For it became the favourite residence of Catherine's parents, and great was their interest and delight in the magnificent palace that had been built on a hill close by the city by generations of Moorish kings. The Court of the Alhambra at the Crystal Palace gives some idea of the wonders of Moorish decoration, and many travellers to Spain have recorded their delight at the glories of the numberless courts and galleries, the halls and lovely gardens with marble baths and fountains, of this wonderful spot. All is so beautifully painted and carved that the walls seem "woven like a cloth, rich as brocade, transparent as lace, and veined like a leaf." By moonlight especially it is a true fairy palace. All the decay of centuries seems to disappear under the soft silvery beams glancing through the fretwork and windows and flooding the open spaces. It all seems like a living enchantment straight from the romantic times of the Arabian Nights. And this is by no means the only beautiful relic from Moorish times. In Seville there is a palace in which the Hall of the Ambassadors is one blaze of lovely colours from the marble floor to the mother-of-pearl and crystal roof.

THE PINK TOWER OF PRAYER, FROM WHICH MEN WATCHED THE STARS

Here is also the wonderful tower, called the Giralda, built by the Moors as a prayer-tower, and for an observatory from which to watch the stars. Its colour is a delicate pink; the view from the top of the bends of the Guadalquiver, amongst the sunny green plains, is most exquisite.

Both Catherine and her sister Joanna must have enjoyed all this beauty in their young days. It was the son of Joanna who became Charles I. of Spain, famous in history as the Emperor Charles V. He was ruler not only over a large part of Europe, but of an immense dominion across the ocean, for in his reign Mexico, Chili, and Peru were added to the already large and rich belongings of Spain in the West Indies. This great sovereign paid a long visit to his aunt in England, and it was his son Philip who married her daughter, Mary Tudor, the year after she became Queen of England.

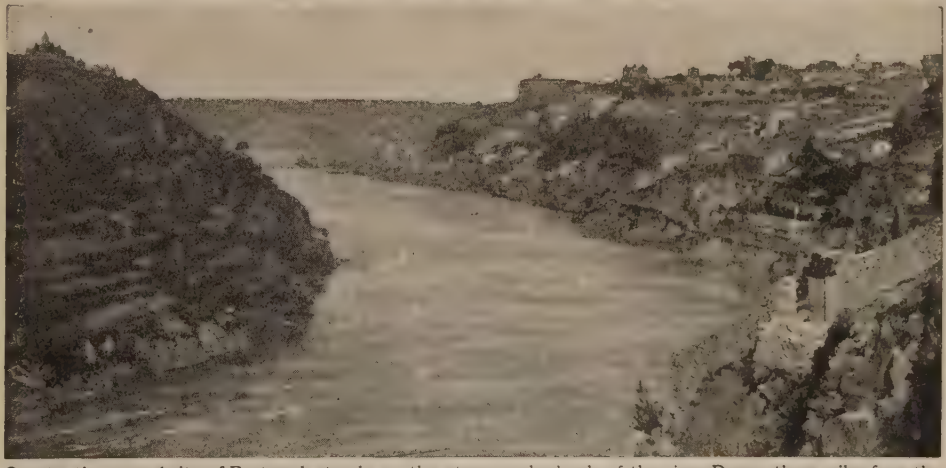
This marriage was very unpopular, for English people were afraid that liberty, chiefly in the matter of religion, would be crushed by the same methods as in the bridegroom's country. In his grandparents' time a Court had been formed with powers to inquire about everyone's faith, and to punish all who did not agree with the Church of Rome, to which, as a nation, the Spanish have always been very firmly devoted. At first it was directed against the Mohammedan Moors and the Jews; but when, in Reformation times, men began to assert their rights to worship God in the way they believed right, all the terrors and cruelties of the Court were directed against them.

HOW THE LITTLE TOWN OF MADRID BECAME THE CAPITAL OF A MIGHTY EMPIRE

This Court of the Inquisition was busy in Philip's reign, not only in his own country, but in the Netherlands, and many people were tortured and burnt because they would not return to the old faith. It was this Philip II. who chose Madrid, then but a small town, to be

IMPORTANT CITIES OF SPAIN & PORTUGAL

Cadiz, one of the most important commercial cities and naval centres of Spain, was founded 3,000 years ago by the Phœnicians. It has a splendid harbour, and twice in the 16th century the English seized and burnt the shipping.



Oporto, the second city of Portugal, stands on the steep, rocky bank of the river Douro, three miles from the sea, and has a large trade. It is the principal place of export for port wine, which really means Oporto wine.

Carthagena is the principal naval arsenal and dockyard of Spain, and an important fortress. Its history dates back to 223 B.C., when it was founded by Hasdrubal, the Carthaginian general, who called it New Carthage.

the capital of the newly united kingdom of Spain. It is near the centre of the peninsula, and is now one of the finest cities of Europe, though it has no natural advantages for a capital, beyond its central position. It is on a high, bleak plateau, dry and shadeless, surrounded by grey rocky mountains. It has no navigable river; communication with the rest of the country was long difficult. Its climate is unbearably hot in summer, and piercingly cold in winter.

THE PRICELESS ART TREASURES THAT ARE STORED UP IN MADRID

Ever since Philip's day magnificent buildings have been erected by succeeding sovereigns. It would take months to see all the splendid pictures, not only of Spain's greatest artists such as Velasquez, of whom we read on page 760, and Murillo, but of the masters of Italy. We can find illustrations for all Spanish history in the galleries as well as in the National Museum, and in the famous collection of arms and armour. Here are the swords of Spain's noblest champions, of Roland and of the Cid; here are banners and tents taken from the enemy, from the times of the Goths and Moors; and amongst many other most deeply interesting things there is a suit of armour belonging to Philip II., with the arms of England engraved upon it, which he wore when he sat for his portrait to the great artist Titian.

About thirty miles away from the new capital, Philip built a country residence for himself, and joined to it a monastery, a church, and a burial vault for Spain's royalty, all in one enormous block. This is the Escurial. Its grand and gloomy style suits well with the bare, rocky country in which it is placed. Philip said he wanted only a cell in which to rest his weary body, but his successors have beautified and enlarged the buildings in every possible way.

HOW KING PHILIP SAT SILENT WHEN HE HEARD NEWS OF A GREAT VICTORY

The seat in the church occupied by Philip when the news was brought to him of the victory of Lepanto, of which we read in our book, is still shown. It is said that he remained impassive till the end of the service, and then he ordered a solemn thanksgiving to be sung. The good news of this check to the sea-power of the Turks had taken just a month to come from the coast of Greece. Though in many respects the reign of Philip was the time of Spain's greatest riches and glory, he had many troubles, too; and his face looks weary enough in his portrait in the National Portrait Gallery, in London, which describes him as "King of England." The loss of the gallant Armada, with the failure of his plans upon England, was a bitter blow, and the constant "singeing of his beard" by the daring sea-rovers of that country must have been very trying.

To the south of Madrid is the district of La Mancha, made famous by Cervantes, who lived about these times, in his celebrated story of Don Quixote, which we read in another place. Here there are still old windmills to be seen waving their long arms over the dreary-looking country.

It was in Philip's days that Portugal fell to Spain, and remained united with her for sixty years, after which it reasserted its independence. The daughter of the first of its new line of kings was Catherine of Braganza, the wife of Charles II. Part of her marriage dower was Bombay, which proved to be an important foothold for England in India.

BRITAIN'S ROCK FORTRESS THAT GUARDS THE ENTRANCE TO THE MEDITERRANEAN

Soon after Portugal was lost to Spain, the Netherlands succeeded in shaking off Spain's heavy yoke. After this came endless years of war between Spain, France, Austria, and England, during which time Louis XIV. was for long a central figure.

One of the chief subjects of dispute was the succession to the Spanish throne. It was during this war in 1704 that Gibraltar was taken by the British. It withstood a tremendous siege about sixty years later. It is still the British flag that waves over this Pillar of Hercules guarding the entrance to the Mediterranean Sea and the route to India by the Suez Canal.

The famous "wooden walls" of Old England were frequently seen in those days cruising about the approach to the Straits of Gibraltar. Two years before the great siege of the Rock, a victory was won over France, helped by Spain, off Cape St. Vincent. It was the same year that saw Lombardy conquered by Napoleon.

A few years later the fleets met again near the same part of the coast. This

THE CRUELLEST SPORT IN THE WORLD

The Spanish people are probably more callous to suffering than any other nation. Nowhere else would bull-fighting, as carried on in Spain, be tolerated as the national amusement. The thoughtless people around this arena are amused by the sight of suffering. The sufferings of the bull, in a fight, are as nothing compared with those of the horse. Here we see the close of a bull-fight, with the matador about to kill the bull.

Another instance of Spanish indifference to suffering is the way the Inquisition was allowed to flourish in Spain right down to the 19th century. Although this institution was introduced into other countries, it was the terrible Spanish Inquisition that became a by-word for much that is shocking in history. Terrible tortures were inflicted by the Inquisition, which punished many crimes now tried by the regular civil courts.

time it was off Cape Trafalgar, and on October 21, 1805, Nelson won his last and most famous victory. But, in spite of this and other checks by sea, Napoleon went his own victorious way by land in Prussia, Italy, Holland, and then came the turn of the peninsula. Some first aggressions having been passed over, France tempted Spain to agree to divide Portugal between them.

How the Old World was Ruled from the New World

The Portuguese royal family and the Court fled in alarm over the sea to their great possessions in Brazil, and for many years this European state was ruled from the New World. But before long Napoleon took advantage of the quarrel between the King of Spain and his son, and a French army entered Madrid and proclaimed Joseph Bonaparte king.

But all Spain rose at this action of Napoleon, and England, in indignation and alarm, quickly sent out supplies and two small armies under Sir John Moore and Sir Arthur Wellesley—who later became Duke of Wellington—to help to make a stand for the independence of the two kingdoms in the peninsula. For six years the war spread itself over the high tableland so difficult to cross and so trying in its extremes of climate. Heroic defences were made, and the peasants who lived in the little grey villages were always ready to rush out and harass the French. The defenders had some success in both Portugal and Spain, and then the tide was turned by the appearance of Napoleon himself. It is about 100 years ago that Sir John Moore made a masterly retreat to Corunna in Galicia, where he lost his own life, but saved the honour of his troops. After this, Northern and Central Spain fell into the hands of France. Wellington, with fresh troops, gained a victory at Talavera which restored the fame of English arms. His next work was to wait patiently, holding his ground in the three famous lines of defence which he threw up at Torres Vedras, near Lisbon.

Napoleon's Vain Boast and How His Army was Driven Out of Spain

At last his patience was rewarded, the French general had to give up trying to drive Wellington out of Portugal, and then the chance came of doing something in Spain. Napoleon had been obliged to draw away some of his best old soldiers to help in the war with Russia, and, in consequence, many towns in Spain were won back, and Joseph was forced to leave Madrid. So was rendered vain Napoleon's boast, "I hold it at length, this Spain so greatly desired," which he uttered as he put his hand on one of the white marble lions, going down the grand staircase in the Royal Palace of Madrid. Finally, after many ups and downs, the French were driven, after the defeat of Vittoria, across the Pyrenees. Months before that, the veterans who had so long held Spain for Napoleon lay frozen dead on the bitter road from Moscow.

The nineteenth century was a troublous one for Spain. By degrees she lost most of the colonies that had enriched her so much in the past. Peru, Mexico, and Cuba became independent, Florida was sold, and the Philippines passed to the United States of America. There were also many disputes about the succession to the crown and the form of government, which led to civil wars and constant changes which nearly ruined the country.

The Building Up of Spain under its Young King and his English Queen

But now things are more settled. The constitution—for long a mere name—is duly observed. The young king, Alphonso XIII., has married an English princess, and they have three children. Prosperity is increasing, as railways, which are very difficult and expensive to build in the central plateau, are gradually stretching over the country. Agriculture is improving, and more attention is being paid to mining and manufactures. Spain is very rich in metals; iron and coal are worked in the north, and the famous mines of Rio Tinto in the south supply a quarter of the world's copper.

Portugal had also had many civil wars and difficulties to contend with in the nineteenth century, and Brazil became independent; but once more the gallant little country, so firm an ally of Great Britain through the years, is reviving under happier conditions. For size and population Portugal may be compared to Ireland.

The capital of Portugal—Lisbon—was almost destroyed by a terrible earthquake in 1755, but it is now rebuilt, and is a beautiful and interesting city,

doing a great deal of trade. From Oporto comes the wine known as port.

Many visitors go to Spain not only to enjoy the fine climate round the coast, but to see the grand old towns which show so many traces of the history of the country.

We have already glanced at the relics of the Romans and of the Moors. Belonging to the Christian times are magnificent cathedrals in nearly every city, and rich treasures of pictures.

The beautiful Moorish Giralda Tower in Seville is now the belfry tower of the splendid cathedral—the largest in Spain, famous for its rich sculpture and fine pictures. It is said that there is never a day in Seville when the sun does not shine; everything is bright and gay, the golden oranges, brilliant flowers, glossy palms, and white houses, with their pretty courtyards. Though the city is about sixty miles from the sea, fair-sized vessels can pass up the river and unload on the quay. After the return of Columbus from his first voyage, the city had a great trade with the Indies. In Seville are thousands of girls making cigars and cigarettes, and the dark little boys running about the streets might have been models for Murillo. Both the artists Murillo and Velasquez were born at Seville.

Cordova, also on the Guadalquiver, was once the greatest city of the Moors, and the wonderful cathedral was once their chief mosque. A thousand columns of beautiful marble support the roof, and look like a forest of stone.

Toledo has a grand position on a rocky height, round the base of which the Tagus circles. Its cathedral is very large and rich, and at every corner of the ancient city are reminders of its strange and wonderful past.

The old Roman Barcelona has grown into a city ten times as large, and is now the first port in Spain, standing on one of the most lovely sites on the Mediterranean shores. It is often called the Liverpool of Spain from its numerous manufactures and busy commerce. There is a fine view of the harbour, always full of shipping, from the lofty monument to Columbus. His figure on a golden ball is 23 feet high. It stands opposite the handsome street called the Rambla, shaded by trees, like the Unter den Linden at Berlin. There is also a handsome cathedral.

Cadiz, most picturesquely situated on a rocky peninsula, with beautiful bays and harbours, is sometimes called the Venice of Spain. It used to be its chief port. Much business is still done round the harbour. Most of the houses have view towers from which to look out to the splendid wide sea. It has been said that the best impression of Cadiz would be given by writing the word "white"

When Philip II. came to the throne of Spain, he succeeded to an empire which a Cæsar might have envied. It was, in fact, the first empire upon which the sun never set. But Philip was an incompetent bigot, and his policy led directly to the break up of this mighty empire. The break up began in his own reign by the successful revolt of the Netherlands, a revolt caused by the introduction of the Inquisition into that land. Here we see Philip in his palace at Madrid, accompanied by his priestly advisers, receiving a deputation from the Low Countries.

with a white pencil on blue paper—so blue are the sea and sky; so white the buildings! Nearly all the large cities of Spain lie on the coastal plains, on which two-thirds of the people of Spain live. Madrid is the chief exception, in which are about half a million inhabitants. Though Spain is larger than Great Britain, there are not half as many people in it.

The people of the Iberian Peninsula come of a very noble and dignified stock. Foreigners often consider them proud, but a great deal of their grand manner, especially amongst the peasants, is prompted by self-respect. The chief national amusement is the famous bull-fight, which is held in the chief cities at holiday times, and to which all the people go gaily dressed in their best, to watch the fighting of men with bulls. The animals are goaded and excited in every possible way, and great are the skill and daring of the toreadors. These men do part of their work on horseback, and it is terrible to think of the sufferings of the poor horses and bulls. The men, too, are sometimes badly hurt. It is a horrible and cruel thing, of which men and women ought to be ashamed, but, unhappily, other nations cannot say too much about the barbarity of it while they themselves hunt tame stags and shoot tame pheasants, and set dogs on to timid hares, and call it "sport."

While studying or drawing the map of the peninsula of contrasts, or modelling its rugged surface, there is much to think over and "see" with the inward eye. We know where to look for green valleys and ashy mountains, some tipped with snow; for the bright gardens of vines, olives, oranges, nuts, and the trackless wastes. And as we glance again round the long coast, what a pageant rises before us: of the Roman galleys, bringing soldiers and colonists; of the Moors pouring in near Gibraltar; of the little ships of Columbus sailing to the golden West, pilots of the rich treasure fleets—the "galleons of Spain" which Drake and others used to intercept. And then we see the gathering and sailing of the mighty Armada in all its glory, and from time to time through the centuries the bridal trains of princesses of the peninsula on their way to become Queens of England.

The Alhambra, the magnificent home of the ancient Kings of Granada, has been described as a fairy palace out of the Arabian Nights, with walls as transparent as lace and veined like a leaf. It is surrounded by a mile of walls.

At Corunna is the grave of the gallant Sir John Moore, and Spanish earth holds many another hero of the Peninsular War. The great duke, who lived to fight many more campaigns, lies in St. Paul's Cathedral. Amongst his greatest victories are those whose names we can find in the Iberian Peninsula, for it is the hardest thing in the world to play a waiting game with really patient courage.

THE NEXT STORY OF COUNTRIES IS ON PAGE 3455

THE NOVELS OF THACKERAY

HAVING read the charming story of "Henry Esmond," we must now read its continuation in "The Virginians." Strictly speaking, the one story is not a "sequel" to the other, as that means a second story in which all the characters of the first reappear, and this is not the case in "The Virginians." Still, it is usually spoken of as a sequel to "Henry Esmond," as several famous characters in that story reappear in "The Virginians," together with their children and grandchildren. Although it is a fine and moving romance, it lacks something of the charm which we find in "Henry Esmond," as George and Harry Warrington, though both manly and lovable characters, have not the splendid qualities of their grandfather, Henry Esmond; while their mother has little of the charm of Lady Castlewood, whose daughter she was. The Castlewoods of the younger generation are also a contemptible set, but Beatrix is, perhaps, more sympathetic in her old age than she was as a young woman.

THE VIRGINIANS

THE STORY OF HENRY ESMOND'S DESCENDANTS

CONTINUED FROM 3270

COLONEL ESMOND had various reasons for leaving England at the close of the reign of Queen Anne. Having become so deeply involved in the Jacobite plots, which were designed to place the son of James II. on the English throne at the death of Queen Anne, but failed for reasons stated in "The History of Henry Esmond," he considered it wise to leave the Old Country. There was also the promise of a new and tranquil life for him in America, wedded to Lady Castlewood, whom he had loved so well and served so loyally. It will be remembered that we left them both happy in their new life in Virginia, where the colonial estates of the Viscount Castlewood, which were Esmond's by right, had been given to him by his stepson, the young viscount.

In the new Castlewood, as they had called their Virginian home in honour of the ancestral mansion in England, a daughter, Rachel, was born to the Esmonds, and she grew up a lively and energetic little woman, immensely proud of her parentage, as she had good reason to be. Like her mother before her, Rachel married at an early age, her husband being the younger son of a Norfolk baronet. His name was George Warrington. They were not fated to enjoy a long married life, and Rachel found herself a widow while still a young woman. She had, however, two sons, George and Harry, who were twins. As George was ushered into the world just half an hour before Harry, he was the heir to the estate; and Harry was taught from his earliest years to respect him as his elder brother. On the death of his dear wife, Colonel Esmond, now well advanced in years, gave over the management of his property to his daughter Rachel, who had shown the most remarkable capacity for the work, and whose business-like energy was known throughout Virginia. She was a little lady with a great belief in her own opinions, and having very rigid ideas of her importance as the daughter of such distinguished parents, she asserted herself to such an extent that, in time, she quarrelled with most of her neighbours as well as with her own sons. She even managed to fall out with her relatives in England by means of correspondence! Her husband had been dead but a short time when she gave out that she was to be known as "Madam Esmond," being prouder of her own name than of Warrington, although the latter was not without honour. And on the death of her father she recognised her son George as the heir of the estates, regarding him somewhat in the light of a young king for whom she was playing queen-regent.

When the boys were fourteen years old they were left a legacy of several thousand pounds by an aunt, and

the imperious Madam Esmond was greatly annoyed when the London lawyer would not recognise her claim to do with the money as she wished.

She would have kept it all for Harry, and because George sided with the lawyer in thinking it should be divided between them, she reproached him with his meanness, and decided she would save up for Harry's fortune.

THE WHIMS OF MADAM ESMOND AND THE BROTHERLY LOVE OF HER BOYS

Thus she went on through life: when she was "out" with one she was usually "in" with the other. It was a happy thing that none of their mother's whims affected the brotherly love of the two boys, who were devoted to each other. Harry was the stronger of the two, but as a boy George was quite as mischievous as his brother, and in a quarrel with a dull and prosy tutor named Ward, whom Madam Esmond admired and had appointed over the lads, George was so successful that the tutor had soon to leave, and Madam Esmond realised from that day there was a master, as well as a mistress, at Castlewood.

Later on, the young master of Castlewood proved that he had inherited something of his mother's hasty temper, when he challenged young Major Washington to a duel, in the belief that the major had made an offer of marriage to the fair mistress of Castlewood.

A gossiping lady companion of hers—Mrs. Mountain—who seemed to think that every bachelor gentleman who visited Castlewood was in love with Madam Esmond, had been responsible for the story, which was quite without truth. Thanks to Harry, who was a great admirer of the young George Washington, the matter was explained, and George apologised.

GEORGE WARRINGTON IS THOUGHT TO HAVE FALLEN IN BATTLE

The efforts of Great Britain to clear the French out of America were now about to be pushed forward with some determination. General Braddock, an officer of great distinction, was sent to the American colonies to organise the operations against the French. On his staff George Warrington became an officer, and so left home to take part in the fighting. Letters were regularly received from him at Castlewood, and read out by Harry to his mother and Mrs. Mountain; but one day came news of a terrible disaster that had overtaken Braddock's forces, and left the French and their Indian allies for the moment victorious. This news did not come from George, and, fearing he might be among the fallen, Harry set out for the front in the hope of discovering his brother's fate.

The death of Braddock left Dunbar in command of the forces, and to the camp of that commander Harry repaired, having heard that one of Braddock's officers was lying there ill with fever. He found, however, that this was not his brother, but his friend George Washington, now colonel, who could give him no good news of George, and believed him to have perished at the hands of the Indians.

Colonel Washington, on recovering, accompanied Harry back into Virginia, and had the pain of listening to the unreasoning reproaches of Madam Esmond, whose sorrow for the loss of her son, combined with her usual hasty temper, led her to accuse the colonel of having abandoned George to his fate.

WHY HARRY WARRINGTON LEFT VIRGINIA ON A VISIT TO OLD ENGLAND

As a consequence of this, life was gloomy and cheerless on the Virginian estate, and, to make matters worse, so far as Harry was concerned, the fever marked him out for a victim. When he was recovered sufficiently he was advised to go away on a sea voyage, and thus came the idea of his visiting the old land of England. Soon after he set sail for England, his mother left the plantation for her town house in Richmond, a thriving young colonial town, where she set up her little throne to continue her harmless amusement of playing the part of queen over the local colonial society.

It was in the summer of 1756 that Harry Warrington arrived in England, accompanied by his negro servant, Gumbo, and took coach from the port of Bristol to Castlewood House in Hampshire, the ancient home of his grandfather's family. Times had changed greatly at this old Castlewood. Harry's Uncle Frank, for whose sake Colonel Esmond had not asserted his undoubted right to the title and estates, was dead, and the new viscount had

One day the baroness showed Harry the portrait of a lovely young woman in the dress of Queen Anne's days, and said: "Harry, that was my face once, and then I was Beatrix Esmond, and your mother is my half-sister."

none of the nobility of his father's character. Indeed, there was nothing to admire in the new family circle at old Castlewood, drinking, gambling, and gossip-mongering occupying most of their time.

This, of course, was not known at first to Harry, who, calling at the mansion in the absence of the owners, was very coldly received by the servants. He left a note for my lord on his return, and betook himself to the village inn. The family returned soon after Harry's call, but when the Baroness Bernstein, the aunt of the viscount, arrived late at night, they had done nothing to welcome their Virginian cousin. Indignant at their ill-manners, she insisted that, unless one of her nephews repaired at once to the inn, late though the hour was, and invited Harry to Castlewood House, she would do so herself. Thus admonished, the viscount's younger brother, William, who, as was so common in those days, was fuddled with drink every night, set out for the inn, only to raise a quarrel there with Harry, who had gone to bed, and finally to be brought back in a wheelbarrow!

Early next morning the baroness made good the ill-manners of her nephews by sending a note to Harry inviting him to "Colonel Esmond's house in England," and when he arrived she presented him, with all her charming old courtesy, to his relatives. Harry immediately became a great favourite with her, and, later, when Gumbo had circulated exaggerated stories about the wealth of the Virginian estates now supposed to be Harry's property, the selfish, low-minded Castlewoods also began to take some interest in him.

One day the baroness, when talking with Harry, showed him the portrait of a lovely young woman in the dress which was worn in the time of Queen Anne, and she said to him: "Did your mother never tell you of another daughter her mother had in England before she married your grandfather?"

"She never spoke of one," he said.

"Nor your grandfather?"

"Never. But in picture-books for us children he used to draw a head very like that," said Harry, looking intently at the beautiful face in the portrait.

"And does the picture not remind you of anyone?" pursued the baroness, with a touch of sadness in her voice.

"No, indeed," said he.

"Harry, that was my face once, and then I was called Beatrix Esmond, and your mother is my half-sister, child, and she has never even mentioned my name!" she said very quietly.

BEATRIX GROWN OLD IS KIND TO HENRY ESMOND'S GRANDSON

The baroness was indeed the wayward Beatrix of long ago, who had caused much sorrow to her mother, and had fluttered the heart of Colonel Esmond. In her old age she had a melancholy pleasure in showing kindness to the grandson of those to whom her conduct had once given pain.

Harry's time was now passed in none too intellectual pursuits, for he soon fell into the habits of the house, playing at cards for money with his drunken cousin, Will, and Parson Sampson, the Castlewood chaplain, who resembled many of the clergy of his time in being more given to pleasure than to good work. He also found himself an object of particular interest to Lady Maria, Lord Castlewood's stepsister, who endeavoured to pass for twenty-seven, though her age was forty. Prompted by Gumbo's stories of Harry's wealth, this designing spinster had conceived the idea of becoming Mrs. Harry Warrington, and Harry innocently was in a fair way to encourage her in her scheme. But the baroness set herself to thwart the plans of Lady Maria for Harry's sake, and took every opportunity of letting him know the truth about that person.

HARRY BECOMES A "YOUNG MAN OF FASHION" AND IS IMPRISONED FOR DEBT

On his way to Tunbridge Wells, a fashionable place of resort at that time, a riding accident was the cause of his being carried to the house of Colonel Lambert, whose wife had been at school with Harry's mother, when Rachel Esmond had been sent to England for her education.

The home-life of the Lamberts was so wholesome and unaffected, compared with the low tone of the Castlewoods, that Harry felt as if he had passed into another world, and could have lingered indefinitely with them, enjoying the society of the colonel's daughters, Theo and Hester, for the former of whom he speedily conceived a tender regard. But he was bidden to join his relatives at Tunbridge, where his easy good-nature let him be led into ways that did him no credit. Among the gay gamblers he was soon a man of note, though many stories of his conduct were exaggerated; and when he moved to London to continue the life of a young man of fashion, he soon found himself in gaol for debt.

On news of this reaching the baroness she was ready to help, but meanwhile the artful Lady Maria had effected a little plan to win the heart of Harry by visiting him in prison, and bringing all the trinkets and jewels he had given her, in order to raise money for his release. His simple, honest heart was touched, and he now felt bound to Maria, so that when the baroness offered to pay all his debts on the condition that he would give up Lady Maria, he refused, and no doubt thought himself a very gallant gentleman in consequence.

GEORGE WARRINGTON COMES TO LIFE AGAIN AT AN OPPORTUNE MOMENT

Harry was still in prison when, one day, to the amazement of the baroness, "Mr. Warrington" was ushered into her room, and for a moment she was bewildered, as her visitor was extremely like Harry. He was none other than his twin brother George, who had not been killed, as was supposed, but, after a term of captivity, had been enabled to make his escape, and had now come to England in the nick of time to save Harry from a foolish step.

George was able to effect the release of his brother, although Colonel Lambert and Colonel Wolfe, good friends of Harry's whom he had treated none too well, were taking steps in the same direction before George's timely arrival. Freed from prison, Harry still foolishly persisted in his declared intention to marry Maria, and the baroness now determined to join forces with George in the hope of turning Harry from his purpose. After she had explained the trickery and hypocrisy of Lady Maria to him, George decided to put Maria to the test. By posing as the

selfish elder brother, he gave out that Harry, having squandered his own fortune, would receive no help from him, and would be dependent on the capricious favour of his mother for the future. This speedily altered the mind of Lady Maria, who had no wish to be Mrs. Harry Warrington in the absence of a fortune, and fortunately she herself took the step of freeing Harry from his promise to marry her.

HARRY FIGHTS AT QUEBEC WHILE GEORGE REMAINS IN ENGLAND

Depressed in spirits, and perhaps just a little jealous of the interest which Mistress Theo showed in his brother George, Harry joined a naval expedition as a gentleman volunteer. Later on, when his friend Wolfe had risen to the rank of general, and was in command of the British forces despatched against the French at Quebec, Harry was invited to become one of his officers, and was present at the great engagement when the gallant Wolfe met his death in the hour of victory.

Meanwhile, George had taken up the study of law in London, uniting with this a practical interest in literary pursuits. He wrote a successful play which the great Doctor Johnson was understood to have seen with approval on its performance. In fact, George was cutting something of a figure in the literary society of the time, and showed his good sense by falling completely in love with Mistress Theo Lambert, whom, in due course, he married, with the somewhat grudging approval of his mother.

Strangely enough, the Lady Maria also married for love, an actor who had performed in George Warrington's play having won her heart, and although the couple were extremely poor we are to believe they were not unhappy. Another and more important wedding, so far as our story is concerned, was that of Lord Castlewood with an American heiress, Miss Lydia Van den Busch, whose wealth did much to restore, outwardly at least, the fading grandeur of Castlewood.

GEORGE WARRINGTON NOW TELLS THE REST OF THE STORY

For the rest of our story we are supposed to read from the papers of George Warrington, whose delight in the literary art led him to put on record some of the more interesting episodes in his own career and the lives of his relatives.

In the year following the taking of Quebec, Colonel Lambert was appointed Governor-general of Jamaica, and was to proceed thither with his family. The day after we heard this news, Theo and I were privately married, lest we should be separated. My mother having written to me before news of my marriage could reach her, urging my return to Virginia, she was none too well pleased at my conduct in the matter, and showed no readiness to help me in the difficulties which I had now to face, through lack of funds, after discharging the debts incurred by Harry.

My hopes were for the time set upon a new play I was writing, but these were presently doomed to disappointment when the play was produced without success. Meanwhile, my Aunt Beatrix had died, leaving all her property, amounting to more than four thousand pounds, "to her dear nephew, Henry Esmond Warrington, of Castlewood in Virginia, in affectionate love and remembrance of the name which he bore."

GEORGE'S FORTUNES BRIGHTEN AND HE SUCCEEDS TO THE BARONETCY

This money I had forwarded to Virginia before I learned that my mother had ceased to send remittances to me; but the death of my young cousin, the son of Sir Miles Warrington, after whom my own son had been named, vastly changed my worldly prospects, and if for the time I felt the lack of means, I had the knowledge that my future was assured. Indeed, it was only in the following year that Sir Miles himself died, and I found myself Sir George Warrington, baronet, of Warrington Manor.

By this time, also, my brother Harry having seen fit to marry Fanny Mountain, the daughter of my mother's companion, the favour which my mother had been lavishing on Harry was again diverted in my direction, and after a time Madam Esmond so far softened towards my wife and myself as to invite us to visit her in Virginia. For some little while this was impossible, but when General Lambert returned from Jamaica, on the death of his wife, we left him in charge of Warrington Manor and set sail.

When we arrived at Madam Esmond's house, my mother met us at the door, and gave both of us her blessing as we

knelt before her. Conceiving a great liking for my dear wife, which was no surprise to me, my mother was presently so entirely amenable to Theo's advice and influence that she relented in her attitude towards my brother's wife, and received her in her house at Richmond.

GEORGE VISITS HIS MOTHER IN AMERICA AND SEES MORE FIGHTING

The political troubles which had long been brewing between the home Government and the American colonies were now at boiling point. For myself I remained loyal to the British Government, while Harry took the colonial side, though this in no wise weakened our brotherly relationship. When war broke out I saw some service under the British flag, but a wound received at the battle of Long Island proving slow of healing, I was led at length to return to my English home, where my elder children had been sent three years earlier.

Before leaving America, however, I had an opportunity of meeting Harry under a flag of truce, in the camp of General Clinton, with whom he was then serving, and the truest of friends and fondest of brothers came with me to the place of parting.

Before the war ended Harry had risen to the rank of general, and afterwards he visited us at Warrington Manor, soon after the death of his wife, whose good qualities he never ceased to praise. It was the fond wish of Theo and myself that he might some day marry Hester, and he did indeed venture at length to propose to her, but she declined to marry so long as her father lived.

I had but little intercourse with Lord Castlewood after I became the master of Warrington Manor, but that nobleman, thanks to the suggestion of his American father-in-law, laid claim to our Virginian estates on the ground that only a life interest in these had been granted by his father to Colonel Esmond, and that it was not intended they should have passed permanently from the possession of the Castlewoods. His brother William, who had been shot as a spy in America, had been there, I suspect, for the purpose of destroying the proofs of our absolute ownership to the Virginian estates.

"Sir George, My Lady, and their Master."

At any rate, my mother discovered that the documents had been burned, but fortunately Parson Sampson, whom I met by happy chance, knew of a copy of the assignment which existed at Castlewood, and boldly going thither we got possession of this, and successfully confronted Lord Castlewood with proof of his dishonesty.

That nobleman had coolly offered to let us retain possession of the estates on payment of a greater sum than they were worth, thus showing his baseness. From that day I never again set foot in the historic home of my ancestors.

SIR GEORGE'S TRANQUIL LIFE AT WARRINGTON MANOR

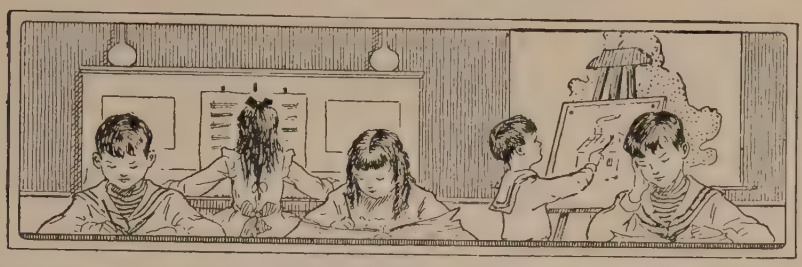
At her house in Richmond, Madam Esmond still lives. Shall I ever see the old mother again? When Hal was in England we sent her pictures of both her sons, painted by the admirable Sir Joshua Reynolds.

We have copies of both of these paintings at Warrington Manor, but the picture which my son, Captain Miles, and the girls declare to be most like is a family sketch by my ingenious neighbour, Mr. Bunbury, who has drawn me and my lady with Gumbo following us, and written under the piece, "Sir George, My Lady, and their Master."

Here my master comes; he has poked out all the house-fires, has looked to all the bolts, has ordered the whole male and female crew to their chambers, and begins to blow my candles out, and says, "Time, Sir George, to go to bed! Twelve o'clock!"

"Bless me! So indeed it is." And I close my book, and go to my rest, with a blessing on those now around me asleep.

The next stories of Famous Books are on 3473.



READING

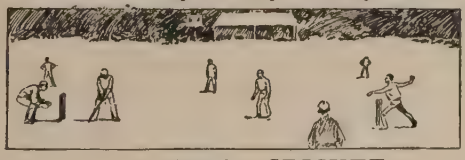
SOME MORE ABOUT VERBS

CONTINUED FROM 3294

Now do you think you will always know a VERB when you see one? Verbs are among the most important words in the world, so we must always be very polite to them, pay them a good deal of attention, and never let them pass without noticing them. They are something like kings among words, because most of the other words are less important, and the verbs rule over them.

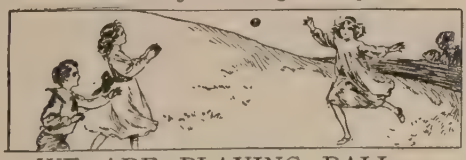
Now I want to ask you three questions, which you must answer.

1. What did you do yesterday?



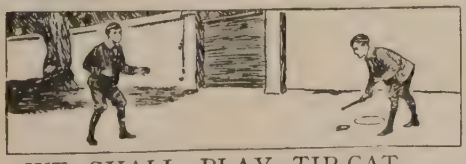
WE PLAYED CRICKET.

2. What are you doing to-day?



WE ARE PLAYING BALL.

3. What are you going to do to-morrow?



WE SHALL PLAY TIP-CAT.

The first answer tells me something that you did yesterday; it is now PAST and gone, and you are no longer playing cricket. You have had supper, and been to bed, and had breakfast since. The second answer tells me what you are doing now at the PRESENT moment; you are so busy at playing ball that you can hardly stop to speak to me. And the third answer tells me what you are going to do to-morrow: you are looking forward to it, it is still in the FUTURE, and you are wishing that to-day would come to an end and to-morrow begin, so that you might start your game.

So you see there are three sorts of TIME: (1) The time that is gone, PAST time; (2) the time that is here now, this very second, PRESENT time; (3) the time that is coming, but has not yet come, FUTURE time. Every verb can be used in all these three ways. Let us try some more verbs and see.

If it was dinner-time, and you were busy eating your dinner, you could say: "I HAD a good breakfast this morning; I AM HAVING a good dinner now; I SHALL HAVE a good tea this evening."

And if a friend saw you in the street, but just as he was running up to you a big waggon came between you so that you could not see each other, you could say: "He SAW me just then; he SEES me not now; he WILL SEE me again in a minute."

Take any verb you like (such as WALK, LOVE, CALL) and try it for

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yourselves; turn it into each one of these three times. But there is one more thing to remember; we do not talk about the TIMES of a verb, but about the TENSES of a verb. TENSE just means TIME, but it sounds more learned. And so you must call I RUN the present TENSE; I RAN, the past TENSE; and I WILL RUN, the future TENSE of the verb TO RUN.

Here are some verses about past, present, and future for you to learn:

Don't fret about the thing that's past,
And be no longer sad;
Your troubles cannot always last,
Nor times be always bad.

Don't waste your time and idly dream
About some future fight:
But like a man that rows up-stream,
Pull hard with all your might.

So do your duty here and now,
The present is your own;
And what you've done, and when and how,
The future will make known.

We have seen that there are different TIMES of doing a thing—Past, Present, Future: and so we have learned about the TENSES of a verb. I think that by this time you see quite clearly the difference between having learned your lessons already and intending to learn them at the last moment just before going to school. The one is PAST, the other is FUTURE; while if you are learning them now, that is PRESENT.

But there is another great difference that we all feel as we grow up, and that is the difference between doing something ourselves and having something done to us. Cruel boys like teasing cats and dogs, but they do not like to be teased themselves. It is very nice from our point of view to catch fish, but it is not very nice for the fish to be caught. Many of us enjoy kicking a foot-ball about, but if the foot-ball could feel, I do not suppose that it would enjoy being kicked.

Now, when a boy kicks a foot-ball, he says, "I KICK the ball," but if the foot-ball could speak, it would say, "I AM KICKED." And when the fisherman feels a fish on the end of his line, he can say, "I CATCH a fish," but the poor fish calls out to his father and mother, "Oh, dear, I AM CAUGHT." And if ever you pull poor Pussy's tail, you could say, "I PULL her tail," but she very likely says, "My tail IS PULLED by this naughty boy; I must scratch him to make him polite."

Do you see the difference? I KICK, I CATCH, I PULL, mean that the person is doing something; while I AM KICKED, I AM CAUGHT, MY TAIL IS PULLED, mean that the person or animal or thing is having something done to him or it. Here are some more sentences to think out:

The boy WHIPS his top.
The boy is WHIPPED by his father.
Baby NURSES her doll.
Baby is NURSED by her mother.
I PUT my toys on the shelf.
I AM PUT on the shelf by my big brother.

It is always quite easy to see the difference between these two kinds of sentences. Just ask yourself, "Is the person doing something, or having something done to him?" If he is doing something, then he is ACTIVE (which just means "doing"); if he is having something done to him, then he is suffering something, or, to use another word, he is PASSIVE (which just means "suffering"). So when we come across a verb that tells us the person is doing something, we say that this verb is in the ACTIVE VOICE; and when we come to a verb that tells us the person is suffering something or having something done to him, we say it is in the PASSIVE VOICE. The word VOICE is a very funny one to use here, isn't it? It generally means the tone in which a person speaks (as "This giant has a squeaky voice"), but we must remember that verbs have voices.

"There's all the difference in the world,
As clearly I can see,
Between doing a thing to somebody else
And having it done to me.
It's very great fun other people to tease,
Though sometimes it causes them pain;
But when they pay me back, all the jolliness flees,
I humbly beg pardon, go down on my knees,
And stammer, 'Oh, please, let me off this once, *please*,
And I never will do it again.'"

TOM AND NORA LEARN TO WRITE WITH INK

BEFORE the next writing lesson, Tom and Nora were taken by their mother to buy two little glass inkpots, two pens, and some blotting paper. Then they set about making pen-wipers from a piece of black cloth, cutting out four rounds for each, scalloping the edges, and sewing them together in the middle with pearl buttons.

"Now some nibs from the inkstand drawer, and we have everything ready for writing with pen and ink," said the children's mother. "You notice the inkpots are only three-quarters full, because ink is a nasty thing to spill for it stains so. In putting the pen into it, we take care not to dash the pen against the bottom of the pot, but just dip it in so that the ink covers the nib. Watch how I do it, and see how, when not using the pen, I rest it on the rim of the pot, so that the nib is out of the ink. Remember there is ink in the nib, and therefore the pen cannot be flourished about like a pencil."

Tom and Nora looked carefully at the pencilled copy their mother had already set, and then started to write each of the following words:

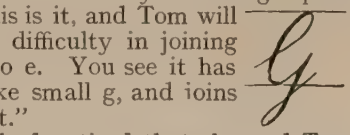
H was quite ready for it, and did not do anything really new.

"G does not manage to join e at all," said Tom, as he looked at the word Get.

"When you can write quite fast, you will want to join every letter," said his mother. "But that will not do yet, for we have to walk before we can run."

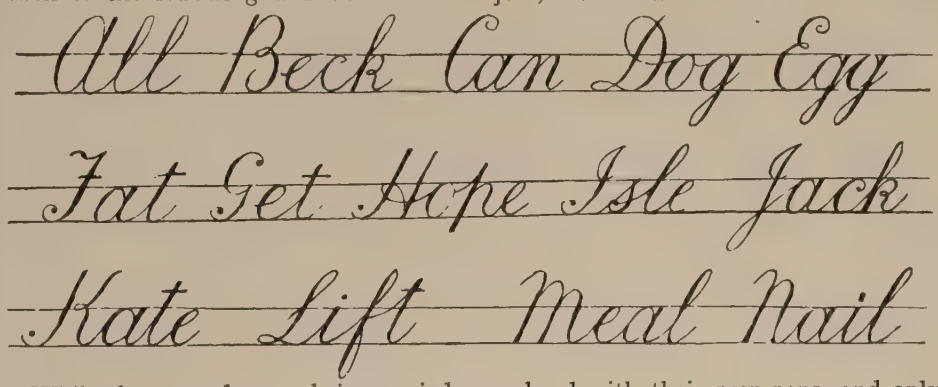
Tom wanted very much to find a way to make G join on, and he tried several ways on a piece of scribbling paper; but every one looked so ugly or awkward that at last his mother came to his assistance.

"Do you remember," she said, "there is another way of making capital G? This is it, and Tom will have no difficulty in joining this G to e. You see it has a tail like small g, and joins on like it."



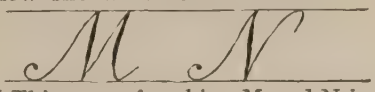
Nora had noticed that she and Tom were writing the capitals in the order of the alphabet, so she was not surprised when the first of the new words to be written was Kate, the name of the nursemaid.

K, L, M and N were quite easy to join, and Tom and Nora had worked



While these words were being copied, the mother pointed out how, when it could be easily done, the capital letter joined on to the small letter to follow. For instance, A, C, E, H and J joined quite comfortably. D was more difficult, because it joined on to o in dog with a long curve, much longer than the one which ended the single capital letter. Nora turned up her old copies of D to compare the two.

H had also a long loop to make to get to the top of o, but then, as Tom said, so hard with their new pens, and only made one smudge between them, that their mother said they should rest and watch her make M and N in another way, as she had once promised. This is how she wrote these letters:



"This way of making M and N is not so common as the way you already know, and the letters are unlike small m and n," she remarked.

HOW NUMBERS ARE DIVIDED

SUPPOSE we have 28 marbles, which we wish to divide amongst 7 boys. How many marbles shall we be able to give to each boy ?

Clearly, if we give each boy one marble, we use 7 of the marbles. If we give each boy a second marble, we use another 7, which makes *two* sevens. We see, then, that the number of marbles each boy will get simply depends on *the number of sevens in* 28. Now, our multiplication table tells us that *four* sevens make 28. Thus each boy will have 4 marbles.

Now, this process of dividing 28 marbles amongst 7 boys is evidently the same thing as finding out how many times we can take away 7 from 28. Thus, division is repeated subtraction.

We must next notice that, if we had been told that 28 marbles are divided amongst a certain number of boys, and each boy got 4 marbles, then we can find out the number of boys. For we have only to think how many 4's make 28. We know that *seven* 4's make 28, so there must be 7 boys.

Either of the results we have just obtained could be got by actually counting out the 28 marbles. We used the multiplication table, but the table itself was formed by counting. In a similar way, we will now try to divide 52 pencils into 4 equal groups.

Suppose we have the pencils arranged in tens. There will be 5 tens, and 2 odd pencils. Now, to divide these into 4 groups, we can begin putting one of the tens into each group. This will leave us with a bundle of ten and the two odd pencils. If we separate this remaining bundle, we shall have twelve loose pencils. We have now only to count out these pencils into the four groups : we use 4 every time we put a pencil to each group, and since there are *three* 4's in the 12 pencils, we shall be able to put 3 more pencils to each group. Each group now consists of a bundle of ten, and three odd pencils—that is, 13 pencils, or 52 divided by 4 gives 13.

We have divided 28 into 4 equal parts, and 52 into 4 equal parts. Let us now examine the process carefully.

In the case of the 52 pencils we had 5 bundles of 10—that is, there were *more* tens than the number of groups. We were therefore able to put a ten into each group, *without breaking the bundles*. Having done this, we had not enough bundles left to put another into each group, so we had to break the remaining bundle and proceed to deal *ones* into each group.

In the case of the 28 marbles there were not enough tens for us to begin by putting a ten into each group. We had, therefore, to begin at once dealing *ones* into each group.

This same idea has to be carried out in the division of any other number. Suppose the number 956 is to be divided by 4. We first divide the hundreds into 4 groups. The number contains 9 hundreds ; we can therefore put 2 hundreds into each group. We now have 1 hundred left over. This hundred consists, we know, of 10 tens. Putting these with the other 5 tens, we have 15 tens altogether. We next proceed to divide these tens amongst the 4 groups. There will be 3 tens for each group, and 3 other tens will be left over. Finally, we take these 3 remaining tens and separate them into thirty units. These, with the 6 units of our number 956, make 36 units altogether. Then, dividing 36 units into 4 groups, we get 9 units for each group. Thus, each group now contains 2 hundreds, 3 tens, 9 units—that is, 956 divided by 4 gives 239.

To do our work on paper, we shall arrange it like this. Write the 4, which is called the *divisor*, in front of the number to be divided, 956 (this number is called the *dividend*), and separate it from the 956 by a bracket. Then say, 4 into 9, **2**, and 1 over. Put down 2 in the hundred's place—that is, under the 9.

$$\begin{array}{r} 4)956 \\ \hline 239 \end{array}$$

Remember that the "1 over" is 1 hundred, and we have only to put this 1 before the 5 to know that there are now 15 tens. Next, say 4 into 15, **3**, and 3 over. Put down 3 under the 5. The "3 over" are 3 tens, which, written before the 6 units, make 36 units. Finally, 4 into 36, **9**. Put 9 under the 6.

ANSWERS TO EXAMPLES ON PAGE 3291.
(1) 862. (2) 1. (3) 1340. (4) 1462. (5) 18.

TWO NEW GAMES OF THE FAIRIES

We have already discovered that there are a great many things to learn before we can get the piano fairies to tell us all their beautiful stories.

We have been playing the game called "The Sleepy Arm," have we not? The fairies look very pleased when they see our arms getting quite loose, because they know we are starting on the right way, and they will be able to make known to us their lovely secrets. So we must go on every day playing this particular game, for in fairyland, as in every other land, we learn and know that "practice makes perfect."

The fairies tell us three things. They tell us that we shall have to use (1) our arms, (2) our hands, and (3) our fingers; but we must get them into such good working order that we have not to think about them, because we shall want all our mind, all our ears, yes, every bit of our intelligence, *to think the lovely sounds* we want to hear.

When we are walking or running we think of the place to which we want to go, do we not? We do not keep worrying about the way we should put our feet on the ground. We have done it so often that the movement has become automatic—that is, the feet seem to move entirely of their own accord. That is just what must happen with our arms, our hands, our fingers. We must exercise them so well that at last we shall feel they are just doing what we want, *without any effort*, without any trouble.

To-day the fairies send us two new games of play. In the first one we go to the table, *not* the piano. We must sit down just as we do when we are playing the piano, extend our hand about three inches above the table, then, quite slowly, we shut the hand, just as if we were gathering up sweets, and as our fingers thus sweep towards the palm of our hand, we shall slightly raise the wrist joint; then we will let the hand bound back again to its first position.

Our second game takes us to the piano. We let the soft little pad of our middle finger just touch Fairy C's note. We must only touch it very lightly, because we do not want to put the note down; we just want to rest on its surface. So, keeping our finger just in the middle of the note, we are to move our wrist slightly up and then down again, about an inch each way. This game is called the "Fairies' See-saw," and the great thing to remember is that we must *keep our arm quite loose;* there must never be the slightest stiffness.

These are the games the fairies want us to play with each hand alternately—that is, first one and then the other—for quite ten or twelve lessons, for everything we are doing is important.

One day a little girl said to her mother:

"It seems stupid to have to take so much trouble, because clever people do everything quickly."

She was a funny girl to have such a queer idea, was she not? Perhaps we can guess the fairies' answer to such a thought. They told her a little story, and now they are whispering it to us.

Once upon a time there was a little boy named *Felix Mendelssohn Bartholdy*; in the nowadays he is always called *Mendelssohn*. The pianoforte fairies were very fond of him, and he was devoted to them. He knew how much they had to tell him, and he worked hard to find out all they wanted him to know.

The days did not seem long enough for all he had to do, and he used to get up early so that no moments should be lost. If you and I had been in his home in Berlin, we should have found him hard at work at five o'clock in the morning. He took one holiday in the week, and that was on Sunday, which he very much enjoyed. Yet, though he worked so hard, he was very far from being stupid. He played at a big concert when he was only nine years old, and by the time he had reached eleven years of age, he had written quite a lot of music for himself and for all music lovers. If ever we go to the Royal Library in Berlin we shall be able to see some of his manuscripts, and I think we shall find how very neat they are, because Mendelssohn took great pains over everything he did. He grew up, became a great artist, and went on writing beautiful music for you and for me to know and to love.

MAKING SIMPLE PATTERNS WITH FLOWERS

In making patterns, when we get our idea from flowers or leaves, we always have to leave out some of the details because they confuse the eye, and very fine work is only suitable for patterns seen quite close and where very rich ornament is necessary. Simple designs and simple colours are the most successful, and until we can draw very beautifully, we must not attempt anything elaborate.

Seed-vessels and bud of the rose

The best way to get a good idea of the shape of the flower is to brush-work it in *neutral* tint—that is, to mix some brown, grey, or even black paint, and make the best copy we can of all the parts of the flowers.

We will choose to-day some flower or leaf—any flower will do—but one with five petals is best, because it is so useful for decorating all sorts of spaces.

English children love the rose specially because it is England's favourite flower. It has been painted on shields, carved on the ceilings of churches and palaces, and it was worn as a badge by the Houses of York and Lancaster, so that it gave its name to the Wars of the Roses.

We hear often of the golden lilies of France, and, years before either the Britons or the French people existed, the Egyptians used the lotus flower for decorating their temples, their pottery, and their clothes. But these flowers are used in their very simplest forms; the delicate stamens and cut-leaf edges of the rose are not suitable for wood and stone-carvings, and the great secret of good designs is to suit the decoration to the material it is worked in.

Boys and girls who can carve and embroider can begin to make patterns for themselves now, and we will see what we can invent with a rose or any other flower as patterns, one for carving, and another for needlework. Suppose we have a frame to carve, we must have a pattern running all round, as the rose stem suits this style. We must have bold work, and we want contrast in all designs. The rose and its leaves will give us this. Of course, we are not going to copy the illustrations here, but invent for ourselves.

The rose drawn in neutral tint from nature

For embroidery, we can have finer work. It can be worked in silks or fine linen, and these are delicate materials and need delicate designs. We can go a little closer to the rose for this, and have the pleasure of copying the colours too, but must not try to put all the colours in. This would mean failure. Besides, we are not copying the rose itself, only making a pretty suitable pattern for our work out of ideas the rose

has given us, so we shall not attempt to give all the stamens or the veining of the leaves, but make our pattern flat and simple.

When we have sketched out the idea we can draw one corner very nicely, and use tracing paper for the other corners. Tracing paper can always be used in designing when we want to repeat exactly what we have already drawn; but we must be very careful to fit the edges of the pattern together.

The lotus, rose, and lily

There is a paper called transfer paper which can be bought in three colours—red, blue, and black. When the drawing is finished, this is placed between it and the material, and the pattern traced with a blunt-pointed pencil or other instrument. Blue or black is best for wood, red for light-coloured stuffs. There is also sold a white tracing cloth, which is useful for dark, smooth materials.

The cornflower is another very useful flower for designing, the thistle and the oak leaves are very suitable for carving, and we shall find it a help to model our designs in clay before we begin to carve them.

The rose drawn boldly for carving

We can make covers for our sketch-books and blotters and other books, by painting on different coloured linens. For this, the designs look best all in one or two colours, with a strong dark outline. If we want the pattern lighter than the background, we must use *Chinese White*. We can paint all the patterns white first, and afterwards, when it is quite dry, paint over it; or we can mix the colour first, taking care to mix enough.

In most of our hobbies we find the need for patterns, and if we can paint our own designs, the pleasure in our work will be increased.

Pattern for needlework made from the rose and its leaves

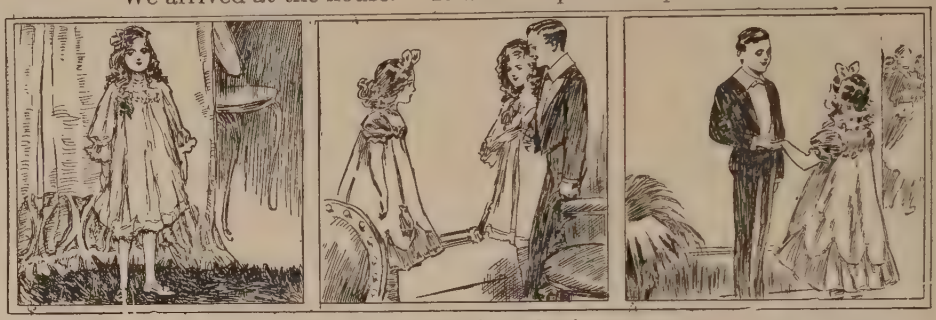
LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English

Hier nos cousins ont donné une fête. Jeannette et moi nous étions invités.
Yesterday our cousins have given a fête. Jenny and I we were invited.
Yesterday our cousins gave a party. Jenny and I were invited.

Jeannette portait une robe de soie, et des souliers blancs. Elle était très belle.
Jenny carried a robe of silk, and some shoes white. She was very fine.
Jenny wore a silk frock and white shoes. She was very fine.

Nous sommes arrivés à la maison. Elle était illuminée du haut en bas.
We are arrived at the house. It was illuminated from the top in the bottom.
We arrived at the house. It was lit up from top to bottom.



Dans le salon nous avons trouvé quelqu'un que nous avons reconnu.
In the drawing-room we have found someone whom we have known.
In the drawing-room we found someone whom we knew.

C'était Annette. Je l'ai invitée à danser. Elle a mis la main dans la mienne.
This was Annette. I her have invited for to dance. She has put the hand into the mine.
It was Annette. I asked her to dance. She put her hand in mine.

La salle était decorée de fleurs. Ma cousine a donné une rose à Jeannette.
The room was decorated with flowers. My cousin has given a rose to Jenny.
The room was decorated with flowers. My cousin gave Jenny a rose.

A neuf heures nous sommes descendus pour le souper. J'avais faim.
At nine hours we are descended for the supper. I had hunger.
At nine o'clock we went down to supper. I was hungry.

Les fraises étaient très bonnes, mais j'aime mieux les glaces.
The strawberries were very good, but I like best the ices.
The strawberries were very good, but I like ices best.

Nous avons dansé le "Sir Roger de Coverley." Puis le bal était fini.
We have danced the "Sir Roger of Coverley." Then the ball was finished.
We danced "Sir Roger de Coverley." Then the ball was over.

Nous avons dit: "Bon soir," et nous sommes allés en voiture à la maison.
We have said: "Good evening," and we are gone in carriage to the house
We said: "Good-night," and drove home.

THE NEXT SCHOOL LESSONS BEGIN ON PAGE 3423

The fire dies down in the cottage. From the painting by Walter Langley, R.I.

WHY DOES THE FIRE GO OUT?

CONTINUED FROM 3242

A FIRE, or anything else that is burning, will go out if the supply of air or oxygen to it is stopped, or if that supply is made so scanty that the burning goes on very slowly, and so does not produce enough heat to keep the coal, or whatever is burning, at the temperature at which it is capable of combining with oxygen; or a fire, or anything else, will go out when there is nothing more left to burn. When a fire goes out in the ordinary way, there is still plenty of burnable stuff left in the grate; and there is still plenty of air in the room, of course; but there is not a good enough draught up the chimney, and the air of the room is not getting to the coal of the fire quickly enough. The air enters the fire almost entirely from below; but perhaps there are many ashes in the grate, choking up the spaces between the bars, and the air cannot get to the coal. So the fire dies of suffocation: it cannot get air. If we clear away the ashes the fire goes on burning.

HOW CAN THE FIRE IN THE CENTRE OF THE EARTH BURN WITHOUT AIR?

Almost everyone is puzzled by the two different ways in which a thing may give out heat and light. A thing does this when it is hot; but it may be hot either because it is burning, or for some other reason. The fire is hot *because* it is burning, and that is why it gives out heat and light; the thread in an electric lamp gives out heat and light *because* it is hot, but it is hot not because it is burning, but because it is made hot by electricity passing through it; the sun gives out heat and light because it is hot, but the sun is not burning. The sun is actually so hot that oxygen cannot combine with the other elements of the sun. The sun's heat is entirely due to other causes. Similarly, the centre of the earth is like a fire, since it gives out a great quantity of heat; but it is unlike a fire in that it is not burning any more than the sun is, or the thread in an electric lamp. We should use the word glowing, and then we can say that the sun and the inside of the earth are glowing though they are not burning. The current through an electric lamp makes the thread glow, though it does not burn. A fire, and many other things, glow when they burn because the burning makes the things so hot that they glow. Any kind of matter that is made hot enough will glow; that is to say, will give out light and heat. The proper way of saying this now is that it will radiate, or give off rays of light and heat.

WHY HAS THE EARTH NO LIGHT OF ITS OWN LIKE THE SUN?

There is no doubt that the earth had a light of its own long ago, and this thoughtful question very rightly suggests that the other planets, too, must surely have had a light of their own at one time, just as the sun has, because the sun and the planets were all made from the same hot cloud, or *nebula*. Now, the question we have to answer is why the earth should have become cool, while the sun still remains hot, so that it can no longer give out any light of its own, but can only reflect the sun's light. The reason is that the smaller a thing is, the more quickly does it lose its heat. The heat escapes from the surface, and the smaller a thing is, the larger is its surface in proportion to the amount of stuff in it. If we go to a place where people are making glass, and get them to make us three or four balls of glass of very different sizes, we shall find that the little one is quite cool when the biggest one is still far too hot for us to touch it.

A baby needs warmer clothing than a grown-up person, and small and thin people need more clothing than large people, because they have such large surfaces to lose their heat by in proportion to the mass of their bodies. As regards the solar system, we can learn especially from the moon and from Jupiter. The only reason why the moon should have become so much cooler than the earth, though it is made of the same stuff, is that it is so much smaller. On the other hand, Jupiter is very large, and astronomers are almost sure that the giant planet is still hot enough to give out some light of its own.

WHY DOES OIL BURN SO EASILY?

Oil is a word covering a great many things, but though these things differ in many ways—in taste and colour and smell, and in their chemical composition—yet all oils agree in consisting of a very large amount of the two elements carbon and hydrogen. Many oils contain a certain amount of oxygen, but no oils contain nearly enough oxygen to satisfy the carbon and hydrogen atoms in them. If hydrogen is to be fully burnt, every two atoms of it need one of oxygen, as in water, H_2O. If carbon is to be fully burnt, every atom of it needs two atoms of oxygen, as in carbonic acid, CO_2. No oil contains anything like this proportion of oxygen to the carbon and hydrogen in it, and so all oils are capable of being burnt; that is to say, of being made to combine with oxygen—and they will go on burning until all the carbon and hydrogen in them have combined with all the oxygen they are capable of combining with; and then when the oil is completely oxidised it is completely burnt, and cannot possibly burn any more.

IS IT BAD TO SLEEP WITH THE MOON SHINING ON US?

It is not bad to sleep with the moon shining on us, but it is very bad to believe nonsense. Every night that the moon shines, millions of animals sleep with it shining upon them, and if anyone fancies that it is bad for human beings to sleep out of doors, whether the moon is shining or not, he makes a great mistake. All notions of this kind are really remnants of the old astrology, which ascribed all sorts of influences to the heavenly bodies, and thought that lunacy—the word came from the Latin *luna*, meaning the moon—was caused by the moon. Moonlight is only reflected sunlight, and, though it is very feeble in proportion to its brilliance, it is valuable, just as sunlight is.

WHY IS IT DANGEROUS TO SLEEP IN A DAMP BED?

One of the greatest facts about water is the enormous amount of heat which it can hold, and the very great quickness with which it can take heat from anything else—in other words, it has a great capacity for heat, and it is a very good conductor of heat. When we sleep in a damp bed, then, the water in the sheets or blankets rapidly takes a large quantity of heat from our bodies—far more than dry sheets or blankets are capable of taking. This means that the temperature of our bodies is lowered because heat is taken from them more quickly than we can make it up by our burning. But if the temperature of the body and of the blood is lowered, its power of resistance to all sorts of microbes, such as those which cause pneumonia or inflammation of the lungs, and those which cause rheumatic fever, is also lowered. And so we are very liable to get any of these diseases, or influenza, or bronchitis, or a common cold, or some others. If we think that the sheets on a bed are damp, we should take

them away and sleep in the blankets. It is not so comfortable, but it is nothing like so bad as getting pneumonia.

WHY DO BABIES REQUIRE MORE SLEEP THAN GROWN-UP PEOPLE?

There is no doubt that babies do require more sleep than grown-up people of any kind, and the smaller the baby, the truer this is. It has been well said that "the whole duty of infancy is sleeping and feeding." Grown-up people require to sleep because they require a period of rest during which their bodies can save and make up for the wear and tear of the waking time. As long as a grown-up person's body can just maintain itself, each night's sleep balancing the loss and injury of the day's work, then all is well; no more is needed. But the body of a child, and, still more, of a baby, has far more to do than this. It has to make itself, whilst the body of a grown-up person is already made and merely has to maintain itself. The body of a baby or a child has to develop and grow. When it is awake, it takes its food by which it grows, but the real growing is done when it is asleep. Then the body uses the food which has been taken in the daytime, and builds it up into itself. If a child, and still more if a baby, does not get sufficient sleep, it cannot grow properly.

WHY, ON WAKING UP, DO WE SEEM TO HAVE SHUT OUR EYES ONLY A MINUTE AGO?

When this happens, the reason is that all our notions of time and its passage come from our consciousness of what goes on in ourselves. That is what gives us our idea of time; and so when we are asleep and unconscious, time does not exist for us, and when we wake, it seems as if time is going on from just where it left off at the last moment we can remember before going to sleep.

But I fear we shall find when we grow up—or perhaps, if we happen to be not quite well, even before we grow up—that our consciousness of time is not always cut off when we are asleep. Children sleep very deeply; if they did not they could scarcely become grown up. But grown-up people often sleep less deeply, and they may be so little asleep that, though they are not really awake, yet they have a sort of half-consciousness of things going on in themselves or around them, especially things in themselves. When we have had a night of this sort of bad, and almost useless sleep, and at last wake fully up in the morning, it by no means seems to us that we have only shut our eyes a minute ago. More often it seems as if the night had been ages long. An hour of deep sleep is worth more than many hours of light sleep, and the deeper our sleep has been, the more valuable sleep we have had.

DO OUR BRAINS WORK WHILE WE ARE ASLEEP?

Part of our brains works always, whether we are asleep or not. If that part stops working, then sleep must become death. This is a part of the brain about which we never feel or know anything directly ourselves; it is the lowest part of the brain, and has nothing to do with thinking or consciousness, but it controls the beating of the heart, and gives the orders to the muscles by which we breathe. The highest part of the brain, that has to do with thinking, is probably never wholly asleep except, perhaps, in babies and small children. But most of it should be asleep, which means at rest, when we are asleep. The deeper our sleep is, the more valuable it is, and the smaller is the part of our brains which is still at work.

Dreams and nightmares prove that our brains work while we sleep. But, quite apart from them, we can prove in many ways that much, even of the higher part of the brain, works while we are asleep. Thus, for instance, a man may go to bed trying to solve some problem in science, or to complete a piece of poetry he is writing, or to invent a new combination of the pieces in chess, or to find out how a crime was committed, or to write a tune to the words of a song, or to do a thousand other things of that kind—and in the morning he may wake and find that during the night, while he was asleep, the brain has done everything he wanted. A great poet once composed a poem in his sleep, and wrote it out the next morning. Sometimes, when the brain has done its work, it will wake the man up, and if one is to be awakened at night, that is the nicest way in which it can happen. The French have a very good proverb which expresses this very well. It is, *La nuit porte conseil*—the night brings counsel.

HOW DO WE KNOW WE HAVE DREAMED WHEN WE ARE AWAKE?

After all, this question, when we come to think of it, is only one regarding memory. We *remember* some of our dreams. A dream is an experience of a special kind; it is something happening in the part of our brain which has to do with consciousness and experience, and the brain's general power of memory applies to this as it does to other cases. But, of course, the brain is in a peculiar state when we dream. The whole of it is not working, and so our recollection of dreams is, as a rule, not nearly so good as that of our waking experiences.

The more clearly we remember a dream, the greater must have been the part of the brain machine that was working at the time, and, on the other hand, there is no doubt that we have many dreams which we do not remember at all when we wake, and which were due to the working of only a very small part of the brain. We see from this that we can judge which dreams are the best kind to have, if we are to have any. The more definite a dream is, the more vivid it is, and the better we remember it. The more awake our brain was when we dreamed, the less was the rest it was getting, the poorer and less valuable was our sleep. But when a dream is scarcely remembered, or not remembered at all, and when it is very faint and vague, then our brain was much less awake during the dream and our rest and sleep were so much the less injured.

WHAT DO THE WORDS ROUND AN ENGLISH PENNY MEAN?

The words round the penny are written in Latin, which was once the language of scholars everywhere. Most of the words have to be written short to save room, and those that are so written have two dots after them. *Georgius* is simply the Latin form of George; *Dei* means "of God," and *gra.* is short for a Latin word, meaning "by grace." The next three words mean King of all the Britains—we know that *rex* means "king," and *omn.* in English words always means all, as in omnibus, which means "for all"—*fid. def.* means "Defender of the Faith," and the last two words, which we shall not find on pennies of fifty years ago, mean "Emperor of India." So that the whole inscription on a penny means:

"George the V. by the Grace of God, King of all the Britains, Defender of the Faith, and Emperor of India." I have a penny in my pocket dated 1866, on which the inscription ends with the words "F. D.," short for Defender of the Faith; but at that time Queen Victoria had not been proclaimed Empress of India, and so "Ind. Imp." is not there. If we look at coins of earlier reigns, we see that the inscription varies a little. Sometimes, for instance, the *omn.* is left out, and there is simply "*Britanniar.*"

DO WE SEE A THING IMMEDIATELY WE LOOK AT IT?

Certainly not. Seeing, and every other kind of sensation, take time. From the instant that the light strikes the curtain at the back of our eyes to the instant that *we see* is quite a long time compared with some things—for instance, compared with the time it takes light to travel a mile. We are apt to think a second the shortest part of time that is worth mentioning, but that is absurd. A second is a period of time so long that light, radiant heat, and electricity could travel almost as far as the moon in such a time. The really wonderful thing about seeing is, that it takes such a small fraction of a second for all the things to happen which are necessary before we can see. Complicated chemical changes have to take place in the living cells of the curtain at the back of the eye. These changes have to produce special nerve currents, which in some amazing way correspond exactly to them, and these run along the eye nerves—first to a group of cells in the lower part of the brain, and then from them, along another set of nerves, to the real eyes—a group of nerve-cells at the very back of the brain, which themselves have developed, and have always lived, in utter darkness. Something happens in them, and then we say *we see*. The marvel is that only a few hundredths of a second are needed for all this that has been described to happen.

WHY, WHEN WE HOLD A LUMP OF BEET SUGAR TO THE GAS, DO RED DROPS COME?

I think I would call these drops brownish rather than red, said the Wise Man, and if we try the experiment with a lump of cane sugar, I do not think we shall find much difference. We shall notice that this stuff in the brown sugar has rather a nice smell, and indeed it helps to make very nice

sweetmeats. Sugar is a very complicated chemical substance, containing carbon, hydrogen, and oxygen. When it is completely burnt, of course it is all turned into water and carbonic acid, but when we put a match to it, or hold it in the gas, it is only partly burnt; in other words, the process of combining it with oxygen only goes part of the way, and so we get a number of oxidation products, as they are called, which contain more oxygen than sugar does, but much less, in proportion, than carbonic acid and water. So, if we could go on oxidising or burning the sugar, in the end we should oxidise or burn away this brownish red stuff completely into water and carbonic acid.

WHY ARE DARK THINGS WARMER THAN LIGHT THINGS?

We can answer this question at once if we know the answer to the question, "Why are dark things dark?" A thing is dark, even in the light, because, instead of reflecting, or throwing back, the light from its surface, it keeps the light, or, as we say, absorbs it. Light and radiant heat are really the same thing, and as a rule anything which absorbs or reflects the one, absorbs or reflects the other. So light clothes throw back from their surface the light and the heat that strike them. Probably nothing will throw back all the light and heat that strike it, and even the whitest snow will melt under the sun's rays. But while light things keep only a little of the light and heat that fall on them, dark things absorb practically the whole, and so, of course, they get warm. Thus a suit of white flannel, for instance, will become really warmer to wear if it is simply dyed black.

HOW MANY MILES IS THE SKY FROM US?

What we call the sky is nothing but the appearance of blue that we get on a bright day, owing to the fact that particles in the air reflect the blue part of sunlight to our eyes. When we see the blue sky, then, what we really see is air. The height of the particles that reflect this blue light to our eyes is not very great. It is perhaps fifty or sixty miles at the most, and, compared with the size of the universe, that is nothing at all. But by the sky we may mean, not the blue sky of daytime, but the great space around us, that we may see on any bright night. We see vastly farther then than in the daytime, because we can see right through the air out to the stars; whilst in the daytime the sun is lighting up all the air around us, so that, though we seem to see a long way, we really cannot see past the lit-up air—except when there is something very bright beyond it, such as the sun itself, and sometimes even the moon.

DO WE KNOW HOW FAR THE SKY REALLY GOES?

If we study the distance of the stars, that in itself, of course, teaches us something as to "how far the sky really goes." But when we have learnt the enormous distances of some of the stars which we can see—distances so great that there is no space to write them in miles, and so we have to speak of light-years, meaning the distance that light travels through in a year—even then we have not begun to say how far the sky goes. If we had a telescope a million times bigger than the biggest we have, and then could find with it the farthest star that it would reveal, we should even then be no nearer the end of the sky than we are now, for there is no end to it. If we travelled out in a straight line through the sky for ever, we should never reach the end of it. That is what we mean when we say that space is infinite, which is simply the Latin word for unending.

WHY DO THE HILLS LOOK BLUE AT A DISTANCE?

The blueness of the sky is due to the blueness of the air, which looks blue to us because tiny specks of matter floating in it reflect the blue rays of sunlight to our eyes. Now, if we look through a layer of anything that is coloured at something beyond it, the layer will contribute its own colour to the colour we see. The blueness of the air, however, is a very faint blue, and we do not usually notice the blueness it contributes to anything near. But when we look at distant hills, we are looking through such a thick layer of air that it gives them a blue tinge. But the actual colour which we see depends upon many other things, as, for instance, the colour of the hills themselves, and the time of day—which decides the angle at which the sunlight falls upon the hills, and also affects the colour of the sunlight. That is enough to explain why the colour of hills is so various and changes from moment to moment.

IS THERE ANY WATER IN THE SUN?

We are quite certain that there is no water in the sun. We know that both oxygen and hydrogen exist in the sun, just as they do in the earth, and we cannot doubt that, as they have a great attraction for each other here to form water, they must have a great attraction for each other there. Yet there can be no water in the sun, because the sun is so hot that none of the elements, not even oxygen and hydrogen, can combine with each other there. By producing intense heat, we can force the oxygen and hydrogen of water apart, and that is what happens in the sun—or, rather, the sun has never been cool enough to allow them to come together.

IS THERE ANY WATER ANYWHERE EXCEPT IN OUR WORLD?

Oxygen and hydrogen, which, when combined, form water, are found wherever we look for them through the universe. In the case of our own solar system, we can prove that, wherever the temperature is not too high, there oxygen and hydrogen, if found together, will combine to form water. That is true of our own earth; but, as we have seen, the sun's temperature is too high for it to be true of the sun. We should expect some of the other planets besides the earth to be cool enough for water to be formed, and in the case of the planet we know best, which is Mars, this is so. We have known for several years that something, which looked and behaved exactly like water, gathered at the North Pole and South Pole of Mars, forming caps of what looked like ice, that increased or decreased at each Pole according to its winter or summer. We also see occasional, but very rare, clouds in the atmosphere of Mars. Many people, however, said that the Polar caps of Mars were not made of water, but of solid carbonic acid, which looks like snow; but it has quite lately been proved that what looks like water on Mars *is* water, and so this very important question is answered.

WHERE DOES THE SEA-WATER GO TO AT LOW TIDE?

The shortest answer to this would be that, at low tide, the water goes to the places where it is high tide. As the earth spins under the pull of the moon and the sun, the water is always being moved about. Of course, it is always somewhere, and if it is not in one place, it must be in another. When it is pulled to one part of the earth and heaped up there, that makes high tide. As we watch the tide rising, what we see is the water being heaped up in our neighbourhood, mainly under the influence of the moon. But if it is heaped up there, it is being drawn away from somewhere else, and that somewhere else is the place where the tide is ebbing. No tide rises but some other tide falls.

WHY DOES IRON FEEL COLDER THAN WOOD?

Our feeling whether anything is hot or cold does not depend wholly upon how hot or cold the thing really is. The marble on the washstand and the towel beside it are both of the same temperature, but the marble feels much colder than the towel. All the parts of a hammer are at the same temperature—unless, of course, one end of it has been heated—and yet the iron head feels much colder than the wooden handle. In all these cases the thing we feel is colder than our skin as a rule, and so heat will flow from our skin into the thing. Our feeling entirely depends on the rate at which the thing takes heat from our fingers. Marble and iron take heat quickly from our fingers; they quickly make our fingers cold, and so we say that they are cold, meaning really that they make us cold.

But wood and cotton do not take heat away nearly so quickly from anything warmer than themselves, and so we say that they are not so cold. Really we should say that marble and iron are good conductors of heat, but wood and cotton are bad conductors of heat.

WHY DO DARK THINGS LOOK SMALLER THAN LIGHT THINGS?

When we see a dark thing against a light background or a light thing against a dark background, it is really, of course, only the light that we see. We see a perfectly dark thing only by contrast with the light around it, and if the light around it were not there, we could not see it at all. We cannot see darkness. Now, it is an interesting fact about the eye, which it is not difficult to understand, that when any part of it is excited by light, the effect of the light spreads a little all round the edge of the part of the eye on which the light falls. It is as if the little light at the edge of it radiated sideways, and so it is called *irradiation*.

Now, when we see a black spot, like a blot of ink, on a piece of white paper, irradiation works in the eye, of course, so as to make that spot appear smaller than it really is, for all round the edge of the part of the eye which is opposite the spot, and on which the light is not falling, a little of the effect of the light from the white paper is being felt. When we see a white spot on a dark background, irradiation works outwards from the white spot into the part of the eye which is really opposite the dark, and so the white spot looks bigger than it really is.

WHY ARE SOME PLANTS POISONOUS?

When we say a thing is poisonous we mean that it is poisonous to us. Some things which are poisonous to us are poisonous to all living creatures, but most things are poisonous to some creatures and not to others; indeed, they may be very good for the others, just as when we say "one man's meat is another man's poison." So long as we have the old idea that every living creature exists for our benefit, it is indeed a puzzle why some plants should be poisonous, why some snakes should be poisonous, why there should be disease-causing microbes, or why tigers should have claws. But if we understand that every living creature exists *for its own sake*, then we shall look at the claws of the tiger, or the poison of the snake or plant, and ask: "How do they serve the life of the creature that has them?" We are only now beginning to learn the meaning and the uses of the various chemical compounds, poisons and others, which we find in plants. Some of them seem to be waste products that the plant is gradually getting rid of; or sometimes the poisons of a plant exist to warn off insects, or other forms of life, which would injure the plant.

WHY DOES IT THUNDER, AND WHICH SIDE OF THE CLOUDS IS THE THUNDER ON?

Thunder is a noise, an irregular wave in the air. Its cause is the very sudden heating of the air, high up above our heads, by the quick passage of electricity through it from cloud to cloud, or from a cloud to the earth. Air offers great resistance to the passage of electricity through it, and when anything resists the passage of electricity, that thing becomes hot. If it becomes hot, it expands suddenly, and so it starts the air-wave we call thunder. A sound—and the same is true of a light made at any place—spreads out, if it can, quite equally in every direction. So the sound of the thunder spreads upwards from the clouds, downwards from the clouds, and sideways through the air and through the clouds themselves. The part we hear is, of course, the part that reaches our ears, part of the wave that spreads downwards from the place where the electricity passed and started it.

HOW LONG DO MICROBES LIVE?

The answer to this question is one of the most extraordinary facts in the world. Of course, a microbe, like anything else, may be killed because it is poisoned, or crushed, or made too hot, or because the water is taken out of it, or, most commonly of all, because it cannot get enough food. But when we ask this question about microbes, we mean: How long do microbes live naturally? And the answer is that *microbes do not die.* The natural end of the life of a microbe, and of other living creatures like the microbe which consist of only one cell, is not to die, but to divide into two pieces, each of which grows and becomes a new microbe, as we see in the pictures on page 785. That is the very simple way in which the race of microbes goes on. If the whole body of a living thing divides into two parts which become two living things, each of which does the same in its turn, then we cannot say that in such a case death happens at all. Many a long book might be written on all that this means, when we compare it with the other kinds of life with which we are so familiar.

WHAT IS THE SHORTEST LIFE IN THE WORLD?

Microbes, and many other creatures, belong to a group of plants with a special name that means the plants that split, because they split into two, so as to form new microbes. From the moment that one microbe has split, until its two halves, having grown themselves, split in their turn—we may call the length of a microbe life. It is the shortest life in the world. The microbe that causes cholera, for instance, splits into two after about twenty minutes, reckoning from the moment when it was first formed out of half of

the microbe that went before it. One microbe in twenty-four hours has been found to multiply into eighty thousand. But we must, of course, understand that the rate at which microbes grow, and split, and so multiply, depends upon conditions, and especially upon the food supply. If there is not enough food, or if there is a tiny quantity of some antiseptic, perhaps, such as carbolic acid, the microbes may remain for a long time without splitting, or they may be killed.

WHY DO NOT ORANGES GROW IN ENGLAND?

Every kind of living creature has certain conditions in which it is fitted to live, certain places which it inhabits. So we use a special word, and say that the sea is the *habitat* of the fish, England of oaks, Spain of oranges, and so on. Some creatures can live in a greater variety of conditions than others. We know only one creature that can keep himself alive in any part of the world, and that is man. But even he lives and works best neither in the tropics nor in very cold countries. Of all the conditions which affect the growth of living things, perhaps the temperature is the most definite. Thus, when we go up a high mountain in a warm country, we can trace, as we go upwards, different kinds of plant life, each corresponding to the different levels of the mountain as it gets higher and colder. The orange-tree is one which requires a hotter average temperature of the air than is found in England, though by no means the very hottest to be found anywhere. So if men alter this one condition of temperature, we can make the orange-tree grow in England quite well, as may be seen at Kew Gardens.

WHEN WATER IS BOILING, WHY CAN IT NOT BE MADE HOTTER?

When water is boiling it can be made hotter, but not as liquid water. Water, like other things, has a certain temperature above which it cannot be a liquid, but must be a gas, and below which it cannot be a gas, but must be a liquid or a solid. That point we call the boiling point. We cannot make water hotter than boiling point, because when we do it ceases to be what we usually call water, and turns into gaseous water, or water-vapour, but it is quite possible to make water-vapour hotter than the temperature of boiling water. If we go on boiling water, we are certainly putting heat into it; and we must not fancy that because the liquid water gets no hotter, the heat is being lost, or wasted, or turned into nothing. Nothing is ever lost, or turned into nothing. What the heat does is to put itself into the liquid water, so that that liquid water takes the form of a gas, and the heat still remains, though rather changed, in the energy of movement of the parts of the gas. We can easily prove that the heat is doing something, though it is not making the water hotter, when we find that if we go on boiling we boil all the water away; that is to say, we turn the whole of it into water-vapour.

WHY DO WE SOMETIMES SAY "GAS" AND SOMETIMES "VAPOUR"?

It is a pity to have two words for the same thing, when they confuse people. You and I, said the Wise Man, are rather apt to think of a vapour as something in the air that we can see; that is to say, something that we cannot see through. But a vapour is really a gas, and a gas is a vapour. Only when a thing at ordinary temperatures is usually gaseous do we call it a gas. When we know a thing best as a liquid or a solid, such as water, we call its gaseous form a vapour. So a vapour is simply a gas, or the gaseous form of a thing that we know best as a liquid or a solid.

WHY DOES BOILING WATER FEEL LIKE COLD WHEN WE PUT OUR HANDS IN IT?

Though we can gain no knowledge except through our senses, we know that they are very apt to deceive us; and the general rule about this is, that the senses deceive us least when they are concerned with something we are accustomed to; but they deceive us most when there is something unusual about the thing we are feeling or seeing. Another general rule is, that the senses are apt to deceive us when they are being excited very intensely. They work best with things they are accustomed to, and with things that excite them neither very little nor very much. In the skin of the hand, there are special arrangements for feeling both hot and cold, and it is a very interesting fact that, as the question points out, when the sensation of heat is extremely acute, the brain is deceived for a moment or two, and makes us feel as if we were touching

something very cold. But no one can explain how this mistake comes about; only this question is well worth thinking about and storing away in our minds with other instances of the mistakes that our senses make.

HOW DO CLOUDS STOP SUNLIGHT IF THEY ARE PURE WATER?

In all its forms, water stops and takes into itself a certain amount of the light of the sun. We know that liquid water does this, for it very soon becomes darker as we go down through it. Solid water, or ice, does so, too. Gaseous water does so least, and the gaseous water which is always present as part of the air does not stop enough of the sun's light for us to notice. But water in the form of round drops suspended in the air, which is what clouds are really made of, can stop a great deal of the sunlight.

We can understand this at once if we remember what a soap-bubble looks like. Here is a bubble made mostly of water; it has a beautifully bright and glittering surface. That means that the light falling upon it is very largely thrown back from its surface. So if there is a cloud made of millions of tiny bubbles or drops—which are also glittering things—it will throw back a great deal of the light that falls upon it. We can understand this when we see the lighted side of a cloud. Nothing could be more brilliantly and perfectly white than the clouds like snowy mountains, which we often see. They are white and bright just because they do not allow the sun's light to pass through them, but reflect, or throw it back, from themselves.

WHY CAN WE HEAR THE SCRATCHING OF A PIN AT THE OTHER END OF A POLE?

Sound is made of waves in matter, waves of a certain kind and rate which our ears can hear. Any kind of matter may be thrown into these waves, and so may convey sound. The thing that conveys the sound, and in which the waves are, is called the medium, which really means the *thing in between*. By far the commonest medium for sound in our case is the air. In the case of fishes, of course, it is the water. But many solid things convey sound-waves extremely well, and when we scratch one end of a long pole with a pin, the matter of which the pole is made is thrown into a series of waves, that go on as long as the pin continues to move, and that we can readily hear through our ear, or perhaps even by merely putting our end of the pole against the side of our head or against our teeth; but the ear is best because it contains special arrangements for conveying sound-waves to the real ear inside our head much better than the bones of the skull or face can do. We have all heard stories of how the Indians can hear sounds at great distances by putting their ears to the ground, and this shows us that the earth may convey sound-waves—that is to say, waves which our ears can feel and appreciate as sounds—just as well as air, or water, or a pole.

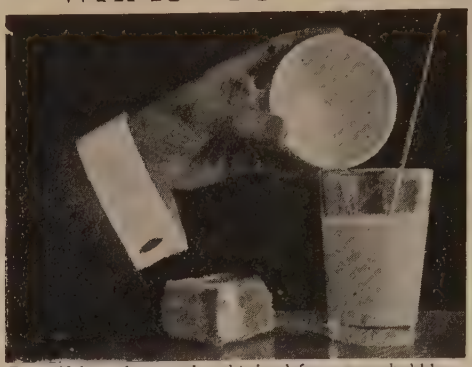
WHY DID THE PEOPLE OF LONG AGO LIVE LONGER THAN THE PEOPLE OF TO-DAY?

Ah, but before answering this question there is another question that must be asked first: "Did people who lived long ago live longer than people do now?" And I have no doubt at all that the answer to that is "No." In all sorts of old records we are told that people lived to great ages; but there are many ways in which this can be explained, one of them being that there were different ways of reckoning age in those days. All the real evidence that we can get from the study of the past, and from our knowledge of uncivilised peoples now living on the earth, shows us quite definitely that the average duration of human life is increasing. The expectation of life, as it is called, of the people who live in our land now is definitely longer than it was twenty, or even ten, years ago, and far longer than it was a hundred years ago.

Perhaps we have noticed that when human beings are children, there is a time when they can hardly distinguish between facts and things that they have imagined. Just in the same way, when mankind was younger than it is now, historians mixed up fact and fancy, not with any desire to deceive, but probably because, in their own minds, they could not keep the two things strictly apart. Many of their fancies were worth putting down and keeping; but nowadays we must try to learn which was fact and which was fancy in what they tell us. Only thus shall we get right ideas of the past.

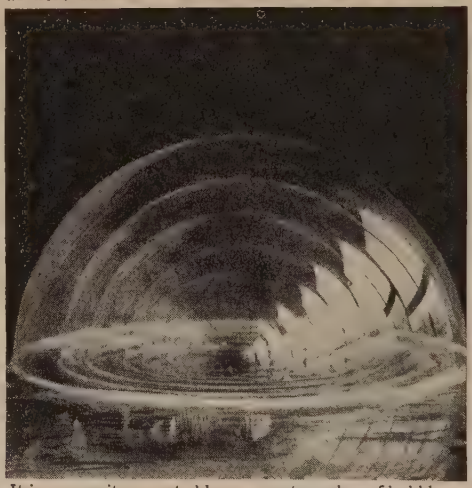
THE NEXT QUESTIONS BEGIN ON PAGE 3429

WHAT TO DO WITH SOAP-BUBBLES

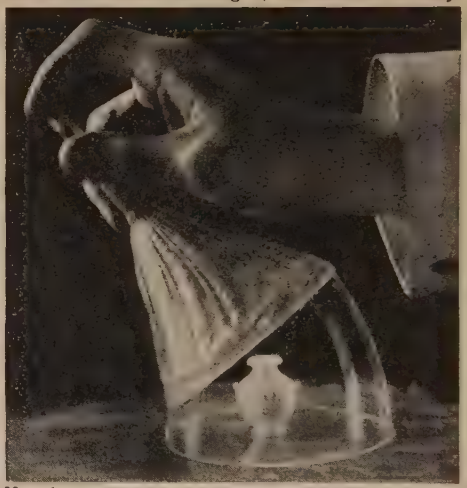


Beautiful results can be obtained from soap-bubbles. We must first make a strong lather by rubbing a piece of best yellow soap in water, skim off the mass of suds from the surface, and pour the solution into a tumbler as here shown. The solution must not be stirred.

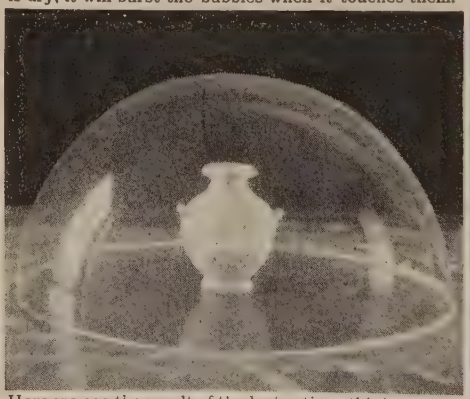
Next we should smear a little of the solution upon a sheet of glass, and blow a bubble through a thin straw. Then, dipping our finger into the solution, we must try to put it right through the side of the bubble. If we can do this without bursting it, the solution is ready.



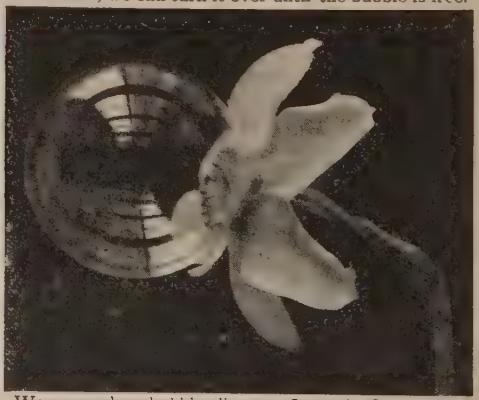
It is now quite easy to blow a great number of bubbles, one inside the other, on a sheet of glass, as shown in the picture. For each bubble the straw should be dipped right into the solution, for if any portion of the straw is dry, it will burst the bubbles when it touches them.



Now let us smear a glass, and also an ordinary funnel, with solution, put the funnel over a little vase, and blow down the funnel, slightly raising it while doing so, until a bubble is formed. Then placing a finger on the top of the funnel, we can turn it over until the bubble is free.



Here we see the result of the last action; this beautiful little vase is standing on a sheet of glass completely inside a bubble. Little model houses and toys can be placed inside a bubble by the funnel, in the same way.



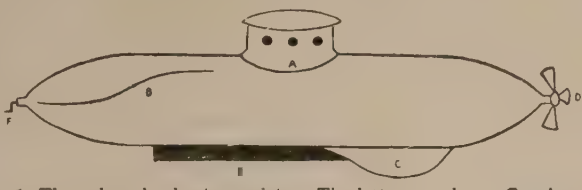
We can make a bubble cling to a flower by first putting the flower in the solution, and then blowing a bubble through the straw on to it. Bubbles can be made to cling to most objects that have been dipped in the solution.

HOW TO MAKE A TOY SUBMARINE

CONTINUED FROM 3286

Most boys have either seen a real torpedo boat, or have seen a picture of one dashing over the sea. They are wonderful little ships that travel almost as fast as an ordinary railway train—twice as fast as the great men-of-war that they are intended to destroy. They dash out at a speed of nearly forty miles an hour towards the great ships, and, when they are quite close, they fire one of the deadly torpedoes they carry, and the torpedo swims under water like a fish, until it strikes the big battleship. Then it explodes and blows a huge hole in the side of the ship. One torpedo would sink the biggest ship ever built if it struck the hull under the water line.

But there are even more wonderful boats than these. They are the "submarines"—the little torpedo boats that swim entirely under water so that no ship can see them coming. They can dive deep down out of sight and fire their torpedoes while they are almost underneath the great battleships.



1. The submarine boat complete. The letters mark: *a*, Conning tower; *b*, curved fin; *c*, keel fin; *d*, propeller; *e*, lead keel; *f*, handle.

Perhaps it has never occured to you that you might make a model submarine that would swim under water just like the real ones. Yet you will not find it difficult if you read this description first, and when you have completed it you will find it one of the most fascinating things you have ever had.

You can make it swim in a bath or a small pond. It will dive under water and travel twenty or thirty yards before it comes up again. With your submarine torpedo boat you can play at a naval battle with your friends who have ordinary wooden boats that float. The floating boats will represent the men-of-war, and you will try to make your submarine swim under the water and hit them. If it touches a boat you must consider that boat destroyed, for that is what would happen in real war if a submarine got close enough. Now let us see how to make it.

First, you must get a piece of wood about eight inches long and two and a half inches thick. A piece of curtain pole will do splendidly, if you can find one that is made of soft wood. With a sharp knife you must cut the two ends to rather sharp points. When this is done your piece of wood will look like a big cigar. The ends should be rubbed with sand-paper till perfectly even.

Now you must drill a hole from one end of the wood to the other. This can be done with a long gimlet. You can bore from each end till there is a hole right through.

Next you must buy a pea-shooter from a toy-shop—it will cost a few cents—and with a file you must cut off two pieces about one inch long. You must make the hole rather bigger at each end of the wood and let in the pieces of pea-shooter. Each piece should project a little, as you can see in the illustration number 5.

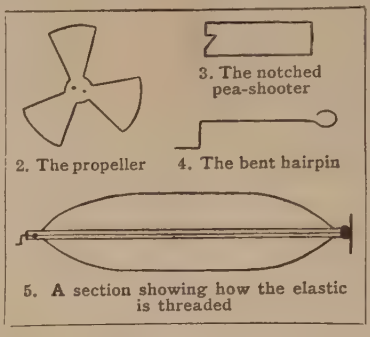
Now you must make the propeller, or "screw," that will drive the submarine. This will be quite easy. You have only to knock the bottom out of a small tin can, and cut it to the shape shown in picture 2. The fan-shaped pieces must be twisted slightly like the propeller of a real ship.

Now drill two small holes in the centre, close together, and pass a piece of elastic through them—the sort of elastic that is used for catapults. Get a big glass bead, rather larger than the diameter of the pea-shooter, and thread the elastic through this, then pass the elastic right through the hole in the centre of the wood.

Now, at the other end, file two little notches in the pea-shooter as shown in picture 3. Then make a little handle out of a hairpin, bent as in picture 4, draw the elastic

rather tight, hook it on to the handle as in 5, and then the mechanical part is done.

If you hold the propeller still and turn the handle at the other end, the elastic will be twisted up tightly. Then, when you release the propeller, it will buzz round quickly and, of course, when you put your ship in the water, it will drive it along.



But at present your boat will float. To overcome this you must get a piece of lead tubing. This should be beaten out flat and nailed along the wood to form a keel. It is of the right weight if, when you put your boat in the water, only just the top shows above the surface.

To make it dive you must nail "fins" to it. These fins are easily cut out of tin, and they must be put on with a slight tilt, as shown in picture 1. A straight "fin" at the bottom will make it complete. Now wind the elastic tightly, holding the propeller with the left hand. Then put the submarine boat in the water, still holding the propeller. Hold the boat steadily about a foot beneath the surface and then let the propeller go. At first your submarine will try to rise, but as it begins to travel faster the fins will keep it below the surface, and it will dart along through the water just like a fish.

If you want it to look particularly smart you can make a "conning tower" out of a piece of wood and fix it to the top.

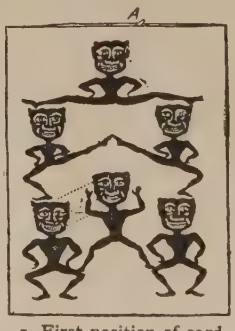
When you have tried it and made sure that it travels well, give it a coat of grey paint, and then it will look just like one of the real submarine boats of which you have heard so much.

If you use it in a pond you need never fear you will lose it, because it will stay under water only so long as the propeller is revolving. When the propeller stops the boat floats to the top of the pond.

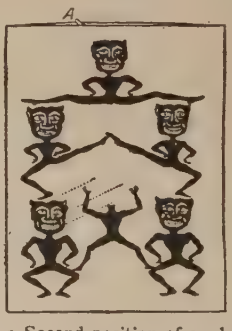
THE IMP WITH A DISAPPEARING HEAD

The apparatus for this trick consists of a card measuring about four inches by three inches, representing six little imps, as shown in picture 1.

You explain to the company that this card, which you carelessly show back and front, represents the celebrated troupe of Hikickalorum acrobats giving their marvellous performance. "You will notice their little feet," you may observe. "I will now show you their great feat, which you will find even more worthy of admiration. The two gentlemen in the middle row will kick off the head of the single gentleman just below them. If you have good sight, and watch them carefully, you will see their legs move."



1. First position of card



2. Second position of card

Holding the card between the second finger and the thumb, the picture side facing the company, you give it a quick wave from right to left and back again. The spectators will *not* see the legs move, though some of them will probably persuade themselves they did so; but, anyhow, there is "no deception" as to the main effect promised. The head of the figure indicated has miraculously vanished, and the picture appears now as shown in 2.

Of course, it would not do to leave the unfortunate imp in this headless condition. You explain that his head has been kicked up into the air, where it is still floating somewhere. "I will endeavour to catch it for him," you say, "or, rather, I will let the owner catch it for himself." Holding the card as before, you give it this time a quick up-and-down movement. If you are clever, the spectators have never lost sight of the figures, but somehow the head is back again as at first.

The picture, though it is to all appearance a simple piece of card, is in reality a very ingenious piece of mechanism. The supposed card is, in fact, two cards, joined together round the edges. Between them works a little lever of sheet brass, with its outer end projecting at the top of the picture, as shown at A. The "head" is movable, working on three bits of fine white horsehair, as indicated by the dotted lines. These are, by artificial light, imperceptible at a few feet distance. When A is as shown in picture 1, the head is in its normal position, but if A be pushed over as shown in picture 2, it is drawn over that of the imp in the lower left-hand corner, which it exactly covers, and so has apparently disappeared off the card.

The working of the trick will now scarcely need explanation. Under cover of the sideways movement the performer shifts the lever to the position shown in picture 2, and the head is gone. Under cover of the vertical movement he shifts it back again, and the head returns.

The cost of the card, from almost any conjuring shop, is not very great.

WHAT IS WRONG IN THESE PICTURES?

There is something wrong in each of these pictures. It will help us to cultivate our powers of observation to try to discover the mistakes the artist has purposely made. They are pointed out on page 3518.

CURIOUS THINGS ABOUT THE ALPHABET

WHEN first we went to school and learned our A B C we did not think it at all interesting. But there are many things about the alphabet which are very curious and very interesting indeed. For instance, if we were given a set of A B C blocks, and were asked in how many different ways we could arrange them, we might, perhaps, say that we could place them in two or three hundred different ways. But if we said thousands, or even millions, we should be hopelessly underestimating the possible number of changes.

A great authority on the alphabet, Professor Max Müller, has pointed out that if we take only 24 letters, which is the number contained in the alphabets of many nations, these letters can be arranged in 620,448,401,733,239,439,360,000 different ways. It is, of course, quite impossible for us to grasp what these enormous figures mean, but let us put it in another way. Suppose we wanted to have all these different arrangements of the alphabet written out, and we set all the people of all the world to work, writing at the rate of forty pages a day, with forty sets of letters on each page, they could not complete the work in a thousand million years!

AN ALPHABET WITH 214 LETTERS

The letters of the alphabet appear practically in the same order in nearly all languages, but how they came to be in this order nobody knows. The number of letters in the alphabets of different languages varies considerably. English and German have 26 letters; French, 25; Spanish, 27; Italian, 20; Russian, 36; Greek, 24; Latin and Hebrew, 22; Celtic, 17; Arabic, 28; Persian, 31; Turkish, 28; Sanskrit, 44; and Chinese most of all, 214.

Of course, in all languages the alphabet is imperfect, and various letters have to stand for more than one sound each. In our own English language, for instance, it is estimated that there are 42 sounds, and only 26 letters to represent them. Even then some of the letters, or signs, are only repetitions of others, as C, which could always be represented by either K or S. Ch, on the other hand, has no letter to represent its sound, which has nothing to do with C or H.

Referring to the myriad ways in which the letters of the alphabet may be transposed, all the words of all the languages, of course, consist of arrangements and rearrangements of a greater or smaller number of these few letters. Martin Luther tells us a story of a lazy monk who, instead of saying his prayers, used to repeat the alphabet and then ask that Providence would put the letters together to form suitable words.

THE ALPHABET IN ONE VERSE

There is one verse in the Bible that contains all the letters of the alphabet except J, which was originally the same letter as I. It is found in Ezra vii., 21, and the little used letters X and Z are found in the names Artaxerxes and Ezra. Two English words contain all the vowels in the alphabet in their right order—facetious and abstemious. At least eighteen other words contain all the vowels, although in these they are not in their proper order: Authoritative, disadvantageous, encouraging, efficacious, instantaneous, importunate, mendacious, nefarious, objectionable, precarious, pertinacious, sacrilegious, simultaneous, tenacious, unintentional, unequivocal, undiscoverable, vexatious.

There is very much that is interesting about the separate letters of the alphabet. E has been described as

The beginning of eternity,
The end of time and space,
The beginning of every end,
And the end of every place.

A BADLY TREATED LETTER

The letter H has always been a difficulty with English people without the advantages of education, and the Cockney habit of leaving it out when pronouncing words in which H should be sounded, and putting it in where it does not exist, has given rise to the following amusing protest of the letter H:

Whereas by you I have been driven
From 'ouse, from 'ome, from 'ope, from 'eaven,
And placed by your most learned society
In Hexile, Hanguish, and Hanxiety;
Nay, charged without one just pretence
With Harrogance and Himpudence;
I here demand full restitution,
And beg you'll mend your Hellocution.

The story is told of a little maid-of-all-work, that when asked by her mistress whether her name was Anna or Hannah, she replied, "Anna ma'am. Haitch, Ha, Hen, Hen, Ha, Haitch, 'Anna."

It is often asked why the letters M and N are used in the English Prayer-book in answer to the question "What is your name?" and in the marriage formula for publishing the banns. Some think the M stands for *Marius*, the Latin word for husband, and N for *Nupta*, bride; but this cannot be, as in the older Prayer-books N only is used and the M does not appear at all. It is probable that the N was originally adopted as meaning *Nomen*, the Latin word for name.

"MIND YOUR P'S AND Q'S"

"Mind your p's and q's" is a very common expression, and has been said to refer to the old habit of chalking up the pints and quarts of refreshment which a man consumed at an inn, and paid for at the end of the week. But it is far more likely to be an expression that originated in printing offices, where, when letters are reversed, as they are in type, the small p's and q's are very liable to be mistaken for one another.

It has often been remarked that acrobats and circus-riders in taking professional names are very fond of adopting names that begin with Z. And yet the letter Z is very rarely found as the initial of a real surname. It is said that never within living memory has a member of the British House of Commons had a name beginning with Z. On the other hand, the Parliament of Victoria, Australia, has never been without such a name, Zincke, Zox, and Zeal being one or two examples.

DOLLS OF MANY NATIONS

PLAYMATES OF OTHER LANDS AND HOW TO DRESS THEM

We all know that our little friends in other lands do not dress as we do, and the coloured picture shows us the kind of clothes they wear. We should be able to tell whether a country were warm or cold if we saw the children dressed, because those who lived in the cold place would be well wrapped up in thick woollen cloth, while the children in the warm climate would wear thin muslin or cotton stuff, and very likely have bare feet.

In hot countries the sun is so strong that it scorches the skin, so we should find the children had very brown complexions—quite a deep, rich colour compared with those who live in colder climates. Generally speaking, in a hot country the hair of the people will be dark, while in a cooler atmosphere the people will be fair. For instance, in India they have black hair; while in Sweden and Norway most of them are fair, and have yellow hair.

There are differences in manners and customs as well as in faces and hair. In some countries the people are far more industrious than in others—generally in the colder ones.

Don't you know how you feel more inclined to work hard on a sharp frosty morning than on a hot August day? Well, the cold and hot climates have exactly the same effect on the people who live there.

We are going to suppose that we have twelve dolls, and that we want to dress each one to represent one of our little friends in other lands. First, we shall find out exactly how to dress a doll like a little French child.

HENRIETTE—THE LITTLE FRENCH DOLL

French women are noted for their good taste in clothes, and the French girl always looks very neat, even if she is quite poor.

The rich people like to dress their children elaborately; their little frocks are most beautifully made, and often cost a very great deal of money. So we must dress the French doll very daintily, using fine blue glacé silk for the dress, with plenty of lace on the underthings—very full petticoats, with frills and frills of lace, and lots of tucks, and everything to make it look "fussy," and very full all round the skirt. Notice the long bodice and very short skirt shown in the picture, also the sash of plaid silk, with fringed ends.

French children are very often dressed entirely in plaid, and always show their knees until they are quite tall.

Observe the white socks, patent-toed kid boots (either black or putty colour) buttoning up nearly to the top of the socks, and the smart little parasol. The hat is very full, and made of lace, with a blue bow to trim it.

The doll's name is Henriette, and she would wear tiny pearl beads round her neck, or perhaps a string of little pale pink corals. She would have a gold bangle, or perhaps two, on her arms, and a bow on her hair, of either black or pale blue silk ribbon.

We must choose a wax doll with a pale complexion and dark hair. In France it is the custom to allow the children to stay up late at night, often till the parents go to bed, so that we shall hardly ever find a child who has pretty rosy cheeks.

GRETCHEN—THE LITTLE GERMAN DOLL

Now we will take a peep into Germany to try to find out what the little peasant children who live there are wearing. We shall have to go right out into the country to find a costume that differs from our own, for if we sought out the little girls and boys of Berlin and the other big German towns we should find them dressed very much like other children. Nevertheless, the peasant class differs very much, because it has a definite costume, which it wears both on work and fête days.

The most striking feature is the "Grannie" bonnet, with its straight front, quite stiff and plain, and full-pouched back. Look at Gretchen's picture, and you will see it. It would all be made of cotton stuff, but of two colours; the back part is white, and the stiff part which goes round the head pale blue, edged with a tiny frill of white.

When we dress our doll we must part her hair and plait it into two pigtails, fastened at the ends with small bows of red ribbon. Therefore, in choosing our doll, we must see that she has long, fair hair almost yellow in colour. She should have a plump little figure and a good, healthy colour.

The soft white lawn blouse is cut rather low in the neck. It is full, and pouches just a little over the top of the corselet belt which Gretchen wears. This is made of black velvet, and is a straight band in shape, supported by two bands going right over the shoulder. It is laced up behind.

The skirt is of cloth or cotton, and dark blue is a favourite colour. Make it full, and gather it into a plain band. It is put on after the blouse; and the corselet, which is a sort of waistbelt, fits neatly over the skirt-band.

The apron has no bib, but quite makes up for that by having *two* pockets—one on each side. It is made of white muslin, decorated with a frill at the bottom hem. Notice that this frill goes a little tiny way only up the sides of the apron.

The stockings are white, and the shoes either brown or black, with low heels, and of a wide, comfortable shape. The sleeves are small, finished by a small plain band which comes *just* to the elbow.

The doll's name is Gretchen, and if we liked we might let her hold a wooden hay-rake to show that she has been at work in the fields.

GRETA—THE LITTLE SWEDISH DOLL

THIS time we are going to see how a little Swedish doll should be dressed. First of all, we must know that the climate of Sweden is much colder than ours. Though they do have warm weather in the summer-time, just as we do, it is generally much more snowy and icy in the winter. So that explains why they wear such thick stuffs and warm clothes. The girls and women are very industrious, and fond of fine needlework. They make most delightful embroideries for their houses, and decorate their own and their children's clothes with charming needlework in wools and silks. They make delicate little patterns on the children's caps and bonnets, and think nothing of embroidering a small coat *all over*—sleeves and back and front as well. Their table-linen and household things are always beautifully worked. When they go out to tea it is quite the custom to take some stitching with them. Some of us would be put to shame if we saw the large amount of beautiful work the Swedish children do.

When a girl is going to be married, sometimes her friends will arrange together to work a quilt for her. They collect small squares of plush or other rich material; each one takes a piece home, on which she embroiders very beautifully her own Christian name. Afterwards all the squares are sewn together, and the bride has a loving souvenir from all her girl friends.

Of course, there are different variations of this costume, peculiar to different parts of the country of Sweden. This has been chosen as being one of the prettiest.

This doll's name is Greta—pronounced just as it is spelt.

As the picture will show us, she wears a white shirt made of fine muslin gathered into a straight neckband; scarlet vest, buttoned together in front with gold buttons, made of red and black striped silk. A piece of red silk, with black lines made on it either with embroidery or braid, would give the right effect, if we are unable to get the right kind of silk. The kind known as English silk can often be bought striped alternately red and black, and it is quite cheap.

The pocket

The jacket is made of dark bluish-green cloth, and here comes in the embroidery, which goes all over it in a pattern composed of triangles and lines—not at all a difficult one to copy. It is worked in black wool, the triangles filled in, and the lines outlined. It will be found better to cut out the coat a plain, tight-fitting shape, embroider it, and then sew it together afterwards. It might be lined either with thin silk or muslin.

The skirt is full, made of black cloth, with a scarlet hem, also of cloth. The apron is dark blue, and not of cotton, as we have them, but of cloth. On the cloth is a pattern of fine white lines, which may be suggested by cotton threads run evenly through the surface of the cloth.

The pocket is the most fascinating detail. It is dark blue or red at the back, with a white front forming the pouch part, ornamented with pieces of the red cloth cut out in shapes sewn on with white thread; the stitches show and form white spots or crosses round the edge of the red shapes.

The cap is red satin, with yellow and blue flowers and leaves embroidered on it. It is in shape rather like our Puritan bonnets, but more open at the back, showing the hair well, and pointed in front.

The Swedish people are very fond of embroidery. Just notice how much there is on this one costume.

The shoes are black, with tongues and buckles, and the socks are white.

FILOMENA—THE LITTLE ITALIAN DOLL

IN beautiful Italy there are, of course, many classes of people, just as there are in our country, but it is only among the peasant class that we shall be able to find a typical or distinctive costume. The town folk dress much as we do. The dress we can see in the picture is one that would be worn by a little fisher girl. Her name is Filomena. We must try to buy a doll with dark hair and eyes and an olive-tinted complexion, because we have to represent a little girl who spends many hours of her time in the open air and bright sunshine. So she must have a brown skin, and a pretty pink colour in her cheeks.

To describe the frock, we will start at the top with the head-dress, which is made of a square scarf, either white or any gay, light colour. We will choose red with an orange and blue border. It should be folded corner-wise, and placed on the head with the two corners which come together hanging down at the back, and the other two—which are folded in half—hanging at the sides. The side-pieces are then raised to the top and pinned there.

Next comes a pair of red coral ear-rings, and a coral necklace to match.

Filomena's blouse should be made of fine white lawn, made very simply, and gathered at the neck into a narrow band. The sleeves are long and full, and are finished with a narrow cuff. The skirt is made of the same material, trimmed at the hem with a couple of rows of bright scarlet braid. The skirt should be made full and loose.

The little corselets, which are quite a feature of all Italian peasant costumes, are made of black velvet, and drawn together with red laces. We shall not find these difficult to make. We should fit them to our doll, make a little seam down the centre, if necessary, stiffen them with lines of machine-stitching, so that they will keep quite firm, and work eyelet-holes to thread the laces through. The stockings are of white cotton, and the boots of untanned leather.

SOME LITTLE DOLLS OF OTHER NATIONS

These are some of the interesting little nursery playmates of twelve other lands. The countries that these dolls come from are as follows

Henriette	France	Ivan	Russia	Panna	Hungary
Gretchen	Germany	Greta	Sweden	Filomena	Italy
Pieter & Wilhelmina . .	Holland	Dolores	Spain	Chandi	India

We learn how to dress these pretty dolls in their own picturesque national costumes in the articles beginning on page 3391 of this book

DOLORES—THE LITTLE SPANISH DOLL

SPAIN is very often called Sunny Spain, because the climate is warm, bright, and full of sunshine. People who live in hot countries always love bright colours about them, in their houses and streets, and on their dresses, while people in colder places generally wear greys, black, and dark colours, so that we must find for our Spanish doll some very bright pieces of material. She will represent a dark girl, upright, and of graceful carriage. The women of Spain are noted for their beauty, and have dark, flashing eyes, so we must try to find a doll to fit these requirements. She must have plenty of dark hair, as it has to be "done up."

This costume is one which would be worn on fête days and holidays by a girl from thirteen to fifteen years old. At other times the girls dress very much as we do. The most noticeable feature is the shawl, which is always brightly coloured, and has all round it a deep fringe, knotted at the edge and made of fine black silk.

We must get a square piece of soft silk, brightly coloured and patterned. For instance, an orange ground with red and green flowers on it, or a pink ground with a small pattern in purple, deep red, and blue would do. Sew the fine black silk fringe all round the edge, and the shawl is made. We must fold our shawl from corner to corner, and put it round the doll's shoulders, as shown in the picture, crossed in front, with the ends loosely tied behind. Notice at the same time that the fringe is a deep one in proportion to the size of the shawl; also that it is knotted at the edge joining the shawl.

The bare throat should be decorated with one or two rows of coloured beads.

The skirt is a shape such as we wear, made with a frill at the hem, and short enough to show the ankles. The frill should be put on in little box-pleats, as shown in the picture,

The stockings are white, the shoes black, held on by the pretty little cross gartering, which can be made of narrow black silk or velvet ribbon. Fix an end of the ribbon to each side of a shoe, bring the ribbon round, cross it in front, and tie as shown in the picture.

The cotton apron is striped in several colours—it might be blue, green and red, or perhaps a pink one with mauve stripes; certainly it would be very bright.

The hair, a very important item, must be dressed high up on top, and should have a very tall comb stuck in behind, which shows from the front. A rose of deep red or bright pink will be stuck in on the left side.

It will, perhaps, be impossible for us to get a back-comb in a size to fit the doll. As it is a very necessary feature of the costume, here is a suggestion. Get an ordinary back-comb with an inch-wide top and fine teeth—perhaps one somebody has discarded because a tooth has broken can be found. Combs can quite easily be cut with a sharp penknife, and the edge smoothed with sand-paper or a nail-file. So we shall not find it a hard task to make a back-comb to fit our doll.

Sometimes the Spanish girls wear a lace scarf to drape the hair; this is called a mantilla. It looks very charming indeed, but it is not usually worn with a fringed shawl; it accompanies a costume more like our own—that is, a dress with a bodice and skirt as we wear them. It takes the place of a hat, and is always worn at a bull-fight, the most popular entertainment in Spain.

PANNA—THE LITTLE HUNGARIAN DOLL

As in most other European countries, so in Austria and Hungary—it is only the peasants who still keep to their national dress. In Hungary they wear a costume like that of the little girl in the picture. It is very charming indeed, and belongs to the part of Hungary called Croatia. We will call our doll Panna. She will have a happy little round face, with a healthy colour, brown hair and laughing eyes.

Her cap, or bonnet, which we will describe first, is one of the prettiest head-dresses imaginable. It is made of hand-woven cotton or linen, white or cream, and embroidered very beautifully in the brightest red, green, and violet silk it is possible to buy. The shape of the cap is very simple, for it is only two straight pieces of material.

The embroidery on the frock and bonnet, of which we give a design on this page, must be copied as accurately as possible, because it is a very important feature of the costume.

The bonnet is worked in two shades of geranium-coloured red—a deep, bright scarlet and a very pinkish red. These are not colours which *we* should put together, but they are extremely becoming to the wearer. The dark parts in the design given are filled in with violet and a soft greyish green. The silk used is thick and bright. The background is filled in with red, so that no material shows between the pattern.

We must use the design once for the back piece, and repeat it twice for the front of the cap. Join up the pieces which we see on page 3394, where the letters coincide—A B on the back to A B on the front, and C D on the back to C D on the front. The little hole which is left is filled in with lace stitches, the effect being very like drawn-thread work.

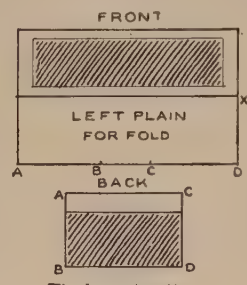
The pattern for the embroidery

The most curious part of the cap is the "fold." The part from X to D is doubled back, bringing the embroidered half of the front to meet the back of the bonnet, and hiding the plain half of the front altogether.

The lace at the edge is of woven brown thread, of a more or less unbleached colour, and it is put on just slightly full.

For the skirt and blouse white cotton is used, embroidered all over in a spot pattern. Cross-stitch is used, and the colours are black and red. Note well how the pattern is arranged in the picture, and also observe the shape of the skirt and blouse. The sleeve is finished with a frill at the wrist, and the skirt is just gathered into the waist.

The coat, which is quite plain in shape and without sleeves, is made of dark blue cloth lined with red silk. The edging is a strip of white cloth "pinked" out to form a border, and put on in between the lining and stuff, so that it stands out all round the edge of the coat. It only differs from the ordinary pinking which we have on our lamp-shades in the little hole in each point. The two rows of very tiny buttons are silver in colour, and very bright.



The bonnet pattern

The little apron matches the dress in colour and material, except the border which edges it, and appears again a few inches inside.

The sash is a woven wool, or cotton braid, in bright colours—we call it "galon."

Panna wears a necklace of big red and black beads, threaded alternately—first a red and then a black, and so on.

SARAH—THE LITTLE ARMENIAN DOLL

THE complexions of the Armenian people are olive, the hair black, the eyes dark, and the women are noted for their long lashes. Altogether they are considered a handsome race, though their features are large. Our picture shows a little Armenian girl whose duty it is to fetch water in the beautiful earthen pot which she slings over her shoulder by a cord—for there are no water-pipes in Armenia.

Her costume is of cotton stuff—it is hot in the country where she lives, so she will not dress in thick material; the skirt is full, and hangs in flutes all round. It is cut several inches off the ground in length, and shows her bare feet and ankles.

The stuff is beautifully patterned in rich colours in what we usually call the "pine pattern." The little bodice which joins the skirt (they are sewn together at the waist) is a plain, tight-fitting affair, with long sleeves coming to the wrist, where they fasten with a small, plain cuff. It has no collar, and it is fastened in front with a few buttons.

Over this she wears a coat made on the same principle as the costume. It has a full skirt joined to a plain top. The coat-skirt is shorter than the dress-skirt, and the coat-sleeves are short, coming to the elbow, and finish with a narrow frill of the material, which, by the way, is a dark blue or dark purple cotton.

Over the coat she wears an apron. There is plenty of stuff in the apron, but it is all gathered in so closely that it does not cover up much of the front of her dress. It is made of white cotton with a wide border of blue or patterned material.

The head-dress is very simple—just a brightly coloured handkerchief or square of cotton folded round the head.

AHWEAH—THE LITTLE ESKIMO DOLL

WE all know where the Eskimo people live—right up near the North Pole, where it is always cold, and the winters are long and dark. It will not take us long to guess, when we think of this, how these people are dressed. Of course they are wrapped up in fur, because there is nothing else in the world which keeps one so warm and cosy as fur does. The people are very strong and rather plump. They are decidedly small in stature, and have small hands and feet. Their complexions are swarthy—by that we mean, of course, that the skin is a pale yellowish brown—and they have broad, flat faces, with eyes that slant in a way that reminds one of the Japanese.

The most strange part about the Eskimo costume is that the men and women are dressed alike, both wearing trousers, boots, and gaiters. The only difference is that sometimes the lady wears a few beads.

The garments themselves are quite plain in shape, and the only ornamentation is a white skin sewn into the middle of the front. A pointed piece of fur, either cut from the tail or head of the animal, makes a sort of little tab or finish at the bottom of the front of the coat. The cuffs are white, too, to match the front piece.

The hood is a warm, tight-fitting one, coming closely round the face, and it has a little point sticking up behind.

The little girl shown in the picture, whose name is Ahweah, wears, of course, trousers to keep the cold from her legs. They are stuffed inside the top-boots, which are made of leather, with good stout soles to keep the wet out. The gloves are of leather, too, and have a thumb-piece only, like a baby's gloves.

Her hair, which is jet black and very straight, is plaited into two tails as soon as it is long enough. In the front it just hangs in little straight pieces over the forehead, and is decidedly irregular in length. The Eskimo boy has his hair cut off in a straight line across his forehead, a short distance above his eyebrows, but the back grows long just as his sister's does.

LITTLE DUTCH DOLLS—PIETER AND WILHELMINA

BEFORE we begin to dress these dolls we must look at the picture very closely. We will begin with the boy doll. This costume is very easy to make, because it is a very simple one, both loose and comfortable as well as warm. We shall see that he has extremely baggy trousers, reaching to the ankles. These should be made of dark blue cloth, and cut very full indeed.

His coat is of dark grey cloth, buttoned up to the neck. Underneath is a red striped waistcoat, the collar of which can be seen just peeping above the coat. At the waist are worn two silver buttons, always as big as can possibly be afforded. Sometimes they are like small saucers, and stretch right across the body, but most little boys can only get them the size of a half-dollar.

At the throat the red waistcoat is fastened with two gold-coloured buttons, and the buttons which fasten the coat are of silver. The buttons of a Dutch boy are his jewellery, and a very important thing with him.

Pieter's hat is a felt or cloth one, round in shape and fairly tall, but with no brim. This must be made to fit his head. Cut a small circle of cloth for the crown, and to this join a straight piece—that is, a strip *as long as the circle is round.* Then make the join as invisible as possible, and the cap is complete. These hats are like a thimble in shape, tapering a little towards the top.

The wooden shoes—sabots, they call them—can be made out of thin cardboard or canvas, glued together, if we cannot find a pair of real wooden doll's sabots. They are often to be found for sale in toy-shops, however, and are quite cheap.

Pieter must, of course, be a boy doll, with short, *straight* hair. He is fair, and has a healthy, "fresh-air" complexion.

The little Dutch girl's cap is made of white lace or embroidered muslin. It fits tightly to the head, and has wide side-pieces, which turn back from the face and form flaps, or "wings." These caps are stiffly starched to make the wings stand out, so we must make ours of stiff muslin. If we use lace, we shall have to insert a fine wire at the edge.

The bodice is tight-fitting, with elbow-sleeves. The square vest in front has an inner chemisette of white, and is bordered with a band of plain or differently coloured material from that of the bodice itself, which is a patterned cotton. Round her throat the Dutch girl wears a handsome necklace of corals, several rows held together in front by a large gold clasp.

While in America the women try to look slim, the Dutch lady, to be really well dressed, must look as big as possible. She must try to appear quite fat, and the more woollen petticoats she wears the better! It is the fashion in Holland to have a lot of petticoats. The skirts only come to the ankle, and the petticoats are cut the same length, so that when she walks the Dutch girl swings her skirts to and fro, and the petticoats can be seen. The richer the lady the more petticoats she wears. Therefore, we must make our doll plenty of thick petticoats and a dark cloth skirt. Make them all very full, gathered in all round the waist.

The apron, which should be white or blue, has a piece of check material at the top. We can see how this is done in the picture. Notice that there is no bib as we have, and that the fastening is a plain band, very narrow, buttoning at the back. The sabots are the same as the boy's, and an American doll, either dark or fair, will represent Wilhelmina.

We should remember that there are very many different kinds and colours of costumes in Holland, some, of course, much more elaborate than these, but they all bear a "family likeness" to the Dutch costumes described here.

The Dutch people wear, perhaps, the quaintest and prettiest costumes of any.

IVAN—THE LITTLE RUSSIAN DOLL

RUSSIA is such a large country that in different parts of it the climate varies from quite hot to quite cold. On the whole, however, it is considered a cold country, and in St. Petersburg, the capital, they have very severe winters; they are so cold that the river freezes over until the ice is strong enough to bear the weight of horses and carts. Then people bring out their sleighs and carts specially fitted with flat pieces of steel, like huge skates, instead of wheels. These glide along the ice road made by the frozen river, going along at a tremendous speed.

It is easy to understand that people need very warm clothes for these ice journeys; in fact, everyone who can possibly afford it wears furs.

Not only is the hair of the fur warm, but the leather from which it grows also keeps out the cold. And so we are going to dress little Ivan in fur.

We must get a little boy doll, with short hair; in fact, just like a little American boy in hair and complexion. First of all he will wear a navy blue sailor suit, like those our boys have, but he will wear top-boots with it.

We shall be able to make these out of a piece of soft kid or leather. Notice the shape of them.

Next we come to the overcoat, which is like ours in shape, but lined and trimmed with fur. The fastenings are "froggings" of black woollen braid, and arranged as shown in the picture. Any dark thick cloth will be suitable for the coat. The collar and cuffs are made of long fur, and the lining of a shorter kind.

The little cap, round in shape, fits closely to the head, and is made of fur to match the collar and cuffs.

Little Ivan's costume would not be complete without gloves; in such a cold climate the hands must always be carefully protected.

LOTUS BLOSSOM—THE LITTLE JAPANESE DOLL

THE costume worn by the little Japanese girl is one of the most beautiful in the world. The Japanese are great artists; they are wonderful at making exquisite objects out of simple, cheap material. They excel in this point, and we find the idea carried out in their garments. They have, too, a great love of colour, and, by some instinct, they seem to know how to blend colours in a most wonderful way. So that we shall find their clothes simple in shape, made from almost straight pieces of material—and not much of it. We shall also find the colours very beautiful and well arranged.

Now we will find out how to make a costume for Lotus Blossom, which is the English translation of a real Japanese girl's name.

The Japs are passionately fond of flowers; they give the children flower names, and also dress them in material with flowers upon it.

It is quite easy to buy Japanese printed cotton at any large drapery warehouse. We must be sure that it is real, and not an English imitation, for there is a great deal of difference. The price will be less than a quarter a yard.

Perhaps at the same shop we shall be able to buy a Japanese doll, with almond eyes and black hair.

The shape of the dress is very simple—very much like our dressing-gowns, though the sleeves are different. They are long and straight in shape, and have deep pockets in the end which hangs down. The little owner keeps all sorts of things in here beside her handkerchief.

Let us suppose that we have bought a pale green material with branches of flowers, pink, purple, and grey, trailing across it, and here and there lines of black and gold.

A little fold of purple silk—a slightly deeper shade than the flowers—will just show where the gown crosses at the neck. For the sash we must get a piece of stiffer material—Japanese brocade or gold tissue.

The Japanese girl thinks a great deal of her sash, and is very particular about the way it is tied behind. It should be very wide in front, folded at the back with one loop going up and another going down, threaded through a crossway piece.

Lotus Blossom wears wooden shoes with short stilts that fit into holes in the bottom. She fixes in these stilts during rainy weather to keep her feet off the wet ground.

To dress the hair of a fashionable girl generally takes about two hours—never less, and often longer; it is not surprising, therefore, that the hair-dressing is expected to last for two or three days!

A great variety of combs is used, and plenty of pomade to form the hair into shapes before it is finally fixed. A Japanese girl does not wear a hat in the street—she carries a paper sunshade. We can buy one (doll's size) at a toy-shop.

CHANDI—THE LITTLE INDIAN DOLL

IN our collection of dolls we must certainly have one to represent India. Among the natives of that country we should find a great many different kinds of costume. The class distinctions are very great, and the costumes of each class vary more or less. In our picture we see a nurse-girl, or ayah, as she is called. Her name is Chandi. We see that she has bare feet. She would not wear shoes in the house—that would be considered very rude to her mistress. Just in the same way that an American lifts his hat here, an Indian removes his shoes before entering a house. When in the street Chandi would wear a pair of loose, heelless slippers, made of goat-hide, with turn-up toes and no fastening.

The dress is made of woven cotton material, yellowish in tint and soft in texture. The bodice is like a tunic in shape; it hangs outside the skirt, and comes three or four inches below the waist-line.

It is plain in shape, buttoning up in front with three sets of small buttons, each set containing two buttons.

On the hips at each side the bodice is cut up a little way, and a small piece of the material is inserted to make the garment fuller. The sleeves are plain and fit tightly to the arm, coming only to the elbow. A piping of scarlet cotton edges the neck, the sleeve, and the bottom of the bodice. The Indian woman is exceedingly fond of decorating her costume with a piping of bright colour.

The skirt is made of the same material. It is cut very full and pleated into the waist with a great many pleats; it is cut short enough to show the ankles.

The rest of the costume is composed of a strip of material bordered with a band of scarlet. This piece is draped round the figure and over the head, taking the place of a cloak and hat. To arrange the drapery we must start by tucking one end in at the waist in front; then we must twist it round over the back of the head, and bring the other end over the left shoulder. The ayah holds this in position with her hand as she walks.

She wears many metal bracelets, and on each foot is a metal anklet, one inch wide; they clank together as she walks. A similar piece of jewellery clasps her neck—fastened as old-fashioned bracelets were, with a hinge and a snap at opposite sides of the circle. Her next piece of jewellery is quite easy to make. It consists of very large ear-rings, made of clay or mud, which, while soft, has had stuck into it a number of brightly coloured beads, laid in a pattern composed of either circles or diamond shapes. These ear-rings are so heavy that they are supported by a chain which goes right round the ear.

Chandi's hair is black and very shiny, and is quite straight. It is parted in front and brushed down behind the ears, to be fastened, without hairpins, in a tight knob at the nape of the neck. Her complexion is deep brown all over and her eyes are dark.

WHAT TO DO IN TROUBLE

DUST OR GRIT IN THE EYE

WHEN a little speck of grit or dust gets into the eye and no one is at hand to take it out for us, there are several things we can do. If we feel that the speck is moving about, we can first try shutting the eye a minute. Violent blowing of the nose will sometimes bring the speck out; so will tears. We might take hold of the upper lid with the thumb and forefinger and work it gently over the eye towards the nose. If the speck gets fixed on the surface of the eyeball we can dislodge it in this way, or by passing a moistened fine camel-hair brush or the corner of a handkerchief over the surface of the eye, using a looking-glass, of course. Bathing the eye with cold water, and opening it in cold water will take down the inflammation; so will a cold-water compress. If a spark from a cigar or a piece of hot ash enters the eye, a drop of olive or castor oil will ease the pain. It is bad to rub the eye

SOMETHING IN THE EAR

When by accident an insect flies into our ear we should try to coax it out by turning the ear towards a bright light. So if a bead or hard substance gets in, we risk destroying the drum by poking the bead against it. If we pour water in to try to wash a pea or other seed out, we might simply make it swell in the ear. The proper thing to do is to hold the ear downwards and gently pull at the lobe. If that fails, we must get someone to syringe the ear, or go to a doctor.

TO STOP THE NOSE BLEEDING

If the bleeding is only slight, we can sniff cold water up the nose, apply a handkerchief dipped in cold water to the root of the nose, sit in a chair with the head back, and place a key or a piece of steel at the back of the neck. We should *not* bend down over a basin. If the bleeding is in a constant stream we should send for ice, lie flat, and plug the nostril with a screw of wet rag, until a doctor comes. The collar should be loosened, the hands held above the head, fresh air breathed, and a hot-water bottle applied to the feet.

HOW TO TREAT BRUISES

A blow or a tumble may cause a painful and unsightly bruise, which hurts much at the time and turns purple, black, greenish, and yellow, due to bleeding underneath the skin. One remedy is to apply something cold, whether it be ice, the blade of a table-knife, or a cold-water bandage. A bruised limb should be rested. Arnica and water—one teaspoonful of arnica to a teacupful of water—are soothing when the skin is unbroken; when it is broken, calendula is applied, but the surface must first be washed free from dust or gravel. Should it be much grazed, it must be bound with a clean handkerchief to exclude the air. Sometimes bathing with very hot water gives quickest relief.

STRAINS AND SPRAINS

We "strain" the wrist when we overstretch its tendons or muscles. We "sprain" the ankle or "go over" it when we stretch or tear the ligaments of the joints in that part of the foot. A sprained ankle may disable us for months, and it is unwise to try to walk with it before it is completely cured.

Hot fomentations should be applied to cure a strain or sprain—that is, we lay on the part a cloth dipped in water as hot as we can stand; then we apply a cold-water compress covered with oil-silk and bandaged with gauze in the proper way, and rest it.

WHEN A BONE IS BROKEN

If the bone of a limb be broken, the limb is powerless. Should this happen to the leg, we must not try to move it, but wait till someone comes to lift us on to a stretcher, shutter or door. In doing this a rug or sheet should be carefully passed under the legs and these raised and lowered on to it. The injured limb can be lightly tied to a stick or umbrella which may be at hand, to give it support and prevent the broken bone piercing the skin. When the arm is broken a sling should be made for it out of a large pocket-handkerchief. We can feel along the broken bone and keep the two edges as near as possible together.

BITES AND STINGS

If an unhealthy cat, dog, or any other animal, bites us, its saliva may poison our blood, especially if the bite is taken on a part unprotected by clothing. If the finger is bitten, we must at once bind it tightly higher up towards the hand, then suck the bite and spit out the saliva. As soon as we can get warm water we wash the wound; if it bleeds, all the better. Then we get it cauterised; a burning fusee has done duty when proper cauterising was impossible. The bites of insects are relieved by applying liquid ammonia or rubbing with a lump of moistened washing soda.

The sting of the bee can be removed by squeezing the part, or pressing a ring on to the surface, to force the sting out.

THORNS IN THE FINGERS

If we cannot seize the splinter or thorn with the thumb and finger of the other hand or with a pair of tweezers, we must get a fine needle—a *needle*, not a pin—and tear open the skin in the direction the thorn entered. Then we stroke it along with the needle towards the opening, squeezing the finger towards the same point now and then, and also sucking it to draw out the thorn.

FALLING INTO WATER

If we tumble into a river, lake or sea, the worst thing we can do is to throw up our arms, try to breathe under water, and struggle and scream away all our strength. If we cannot swim we can at least keep our presence of mind and remember that water will float us if we lie quietly on our backs. So we lie flat with the hands down and call for help. If a rope is thrown or a stick held out to us we seize that and are drawn to shore, but if someone swims to the rescue we must be careful not to grip that person round the neck, shoulders or waist, and drag him down under water.

A LITTLE VEGETABLE GARDEN
WHAT TO DO AT THE END OF MAY

It may be that tomatoes are among the things that we have set our hearts on growing. For inexperienced young gardeners the best way to proceed is not to attempt to rear the plants from seed, but to buy a few young plants—a quarter will probably buy more than we need—and they should be ready to plant in the open after a few days' harden ing off. This process is very necessary, as they will have been grown under glass. We will stand the pots a few days in the open, and protect them at night if the weather be unfavourable. After that we must choose a warm, sunny position, and there is nothing better than the foot of a wall looking south. The soil should have been well dug and a little stable manure put at the bottom of each hole, then a layer of soil above it. The hole should be large enough to take the roots quite comfortably.

The usual plan nowadays is to grow only one stem, and even from this the side shoots must be pinched out. The young plants for a time should be watered in the morning rather than the evening, but too much water should not be given, or it may happen that we get luxuriant foliage and not so much blossom as we desire. All the same, the plants must never suffer for lack of water. If the little gardens are full already, or there is no favourable position for the plants, good specimens may be grown in large pots, in boxes, or in lard-tubs.

Soot-water is excellent to use sometimes in turn with clear water and manure-water for our plants. It may be helpful to know how to prepare it. We want some large tub or other vessel, and we tie up our soot in a bag of some coarse material. Lay a thick stick across the top of the vessel, and with a bit of strong string suspend the bag so that it is below the surface of the water. If the water is very deeply coloured we can add some clear water before using, for it must not be used too strong.

It is difficult to give the exact date when to transplant young greens from the seed-bed, so we will say when they are about three inches high. Perhaps we are hoping to grow them on the ground now occupied by the early potatoes. In that case there is some time to wait, for the potatoes are not yet ready to be lifted; but, rather than let the little broccoli and other greens be closely crowded together, we may prick them out a few inches apart on some small bit of spare space, and plant them again to the proper distance apart as the ground becomes vacant.

Do not let us forget what has already been said as to growing lettuces successfully—they must never lack moisture.

The summer is the time for shows and exhibitions, and if we want to exhibit we must prepare for it a long while beforehand by seeing that our vegetables have especial attention. In arranging a dish, let us say, of potatoes it will not answer to pick one, two, or three very large specimens, and the rest very much smaller. We ought to aim at a uniform size, as far as possible—a good even lot—and this applies, of course, to most of the subjects. Suppose we are arranging a basket of vegetables, then let us use plenty of parsley as a background; it helps to make the vegetables look inviting and tasteful.

We may plant out the half-hardy annuals that we have been rearing in boxes, or may choose to buy at this season. In fact, the last week in May is the time when we should fill all vacant places in the flower-beds with plants to make our garden bright and beautiful during summer. In some cold districts cannas, begonias, and dahlias that have been started under glass are generally not trusted to the open until the first week in June.

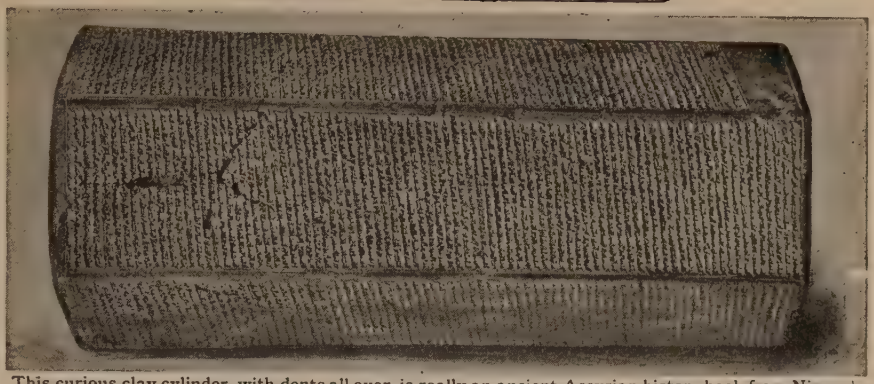
After everything is in place for the summer it is rather a good plan, if needed, to put a little clean, fresh gravel along our garden path, and to see that the edging, whatever it be—box, or stones, or tiles—is quite trim.

Now that the spring flowers are over it is a good thing to remember that plants are weakened if we let them ripen their seeds, so these should be cut off at an early stage. We may sow the seeds of wallflower for next year at any time from now onwards.

ANSWERS TO THE PICTURE PUZZLES ON PAGE 3282

1. The nut-crackers are on the grapes, and the grape-scissors are among the nuts.
2. The handle of the pump is on the left instead of on the right of the spout.
3. The positions of the knife and fork, in relation to the plate on the table, are reversed.
4. These scissors have no centre-screw to join the two parts together, and act as a pivot.
5. The handle of this railway-carriage door is on the side next to the hinges.
6. The flag is waving against the wind, the direction of which is shown by the driving clouds and the bending trees in the distance.
7. The trigger of the revolver is the wrong way-round.
8. The rose is growing on a vine tendril, as is shown by the shape of the leaves.
9. The football-player is playing the Rugby game with a round Association ball. In Association, the players are not allowed to handle the ball; the Rugby ball is of an oval shape.
10. The sword which the warrior wears is buckled on to his right side, whence it would be difficult to draw it with his right hand.
11. The train is running past its signal, which is set at danger.
12. The horn of this motor-car is out of easy reach of the driver.
13. The hour of four on most watches is indicated by the old sign IIII., instead of IV.
14. This motor-van has no number at the rear, as required by the law of the land.
15. These two trains are running side by side, though there is only a double set of rails.

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 3511



This curious clay cylinder, with dents all over, is really an ancient Assyrian history book from Nineveh.

HOW MEN LEARNED TO WRITE

CONTINUED FROM 3325

"PUT this letter in the oven to bake, please." It would sound funny to hear that said to-day, would it not? But that is what people would hear when writing was in its infancy. Thousands of years ago the people of Babylonia and Egypt learned to make themselves understood in writing. They invented signs which stood for letters and words and ideas. These signs were sometimes pictures. A picture might stand for a letter, or for a name, or an article, or for something more. They had to learn to read and write just as we have to. But our manner of reading and writing is a thousand times better than theirs, which was the beginning of all reading and writing.

They had no pens or paper. The Babylonians took soft clay and shaped it into little bricks or tablets. On this they would write what they wished to say, using something which might be a piece of a broken pot, or part of an oyster shell, or something with a square head which would make their wedge-shaped outlines. These characters were impressed upon the soft clay, which was then placed in an oven to bake hard, or left in the sun to dry. They made their books and letters just like they made their bricks. Men who have dug up ruins in our own time have found old tablets of clay which record business matters that took place nearly 2,500 years before the birth of Christ.

For more lasting work, like the recording of laws, they used metal instruments, and with these carved their words on pillars of stone. One of the most wonderful codes of laws in the world—the code of Hammurabi, the great king of Babylon, who reigned more than 2,000 years before Christ—was written on a pillar of rock eight feet high. The laws were carved so perfectly on it that we are able, more than forty centuries later, to read them.

The Egyptians first wrote on stone, but other men of the same nation found that papyrus, a plant growing in the valley of the river Nile, made a good substance on which to write. They used to scratch the letters on with something very much like a pencil, or, better still, write with pen and ink. The ink was generally made from gall-nuts and sulphate of iron. The pens they made by cutting reeds, as we used to cut feathers and make them into quill pens. From Egypt the use of papyrus and reeds spread, by way of Greece, into Europe, and for hundreds and hundreds of years these were the principal substances for writing. But when the followers of Mohammed conquered Egypt, Europeans could not get papyrus, so they had to use a fine leather made smooth on both sides. This sort of leather is still used. We call it parchment. Vellum is another sort of parchment, but it is made

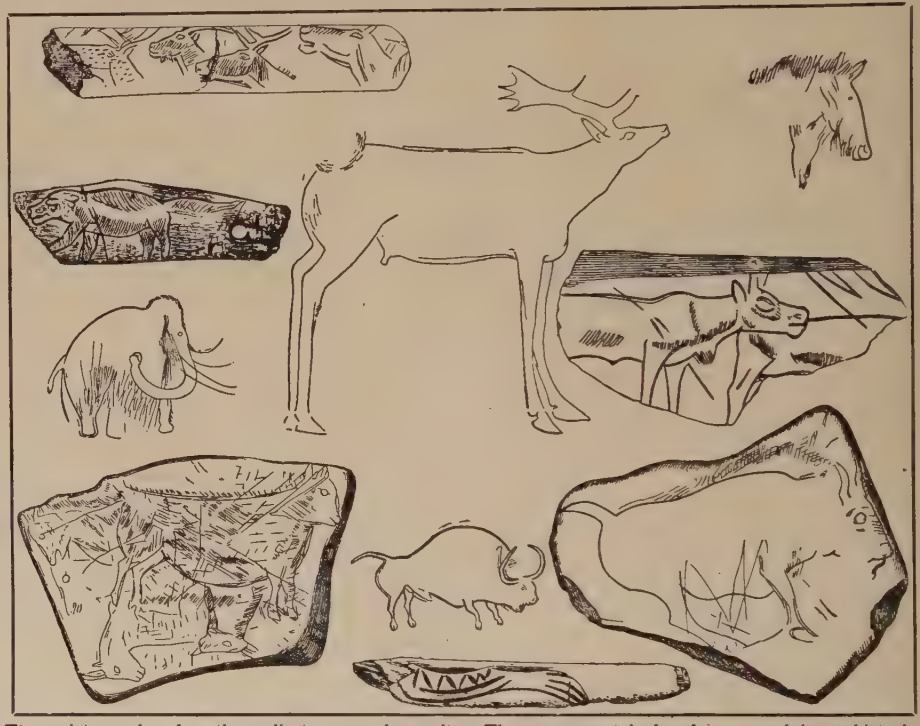
from the leather of younger animals. The Romans used to write on blocks of wood which were covered with wax, on which they could print their letters with a hard point. Nowadays we in this country use the Roman alphabet, but not the Roman way of writing.

The reed pen is still largely used in the East, and it was used in the Western world until the thirteenth century, when quill pens, made from feathers, took its place. The quill lasted until about 1800, when metal pens began to appear on the market. They had been made before, but only as curiosities. Even at the beginning of the nineteenth century they were not soon successful.

People tried to make pens of horn and of tortoiseshell, with pieces of diamond embedded in their points. They also put metal points to quill pens. Nothing much happened until 1820, when James Perry began metal pen making at Manchester, England. He was successful, but Sir Josiah Mason was still more so, for he invented a machine which would make metal pens so quickly and cheaply that everybody could obtain them.

Until after 1840 even school children used quills, but to-day there are more than 100,000 sorts and sizes of metal pens to choose from. The ordinary pen looks simple enough, but it has to go through sixteen processes before it is finished, while the gold nibs for fountain-pens are not finished till they have been through over forty processes.

Pencils came into use some hundreds of years ago, for they are mentioned in a book which was published in 1565. They are not so important for records as pens, because the lead rubs out. That is the very fact which made them important for the purpose for which they were needed. Ink cannot be rubbed out, in the ordinary sense. Where it may be necessary several times to rub out words, or figures, or lines, especially in drawings, pencil is the very thing required. Would not the ancient Britons, who made their drawings by scratching with flints on the rocks, have liked lead pencil with which to make rough sketches before leaving their work to be seen by generations several thousands of years after them?



These pictures show how the earliest men used to write. They were scratched on bone or rock by prehistoric men, and most of the pictures were found in caves. From pictures, men developed signs for words and letters.

MAKING PENS FROM A BIRD'S FEATHERS

For about 1,200 years before the 19th century, quill pens, made from the feathers of the goose, swan, or turkey, were universally used; and millions of quill pens are still made in England for use in offices and courts of law.

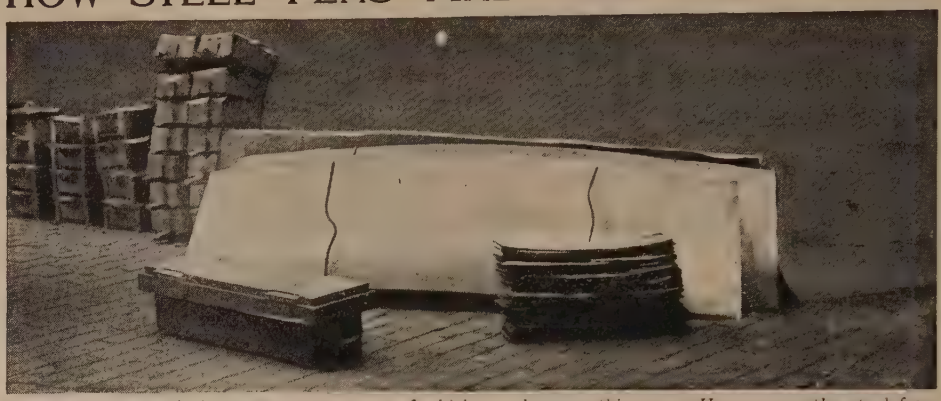
The first process in making quill pens is to harden the quills by heating them in a vessel as the man in this picture is doing.

They are then carefully examined by an expert workman, and those suitable for the purpose for which they are intended are put together, ready for the cutter, who shapes the nib.

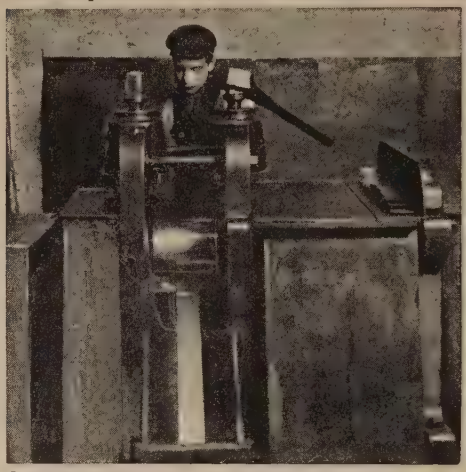
The cutter with a few strokes of his knife produces the finished pen. Men who do this work are very skilful and quick, and make hundreds of pens, in a very short time, without spoiling any.

The quill pens are then tied together in bundles, ready for the shops. Of course the industry is declining every year.

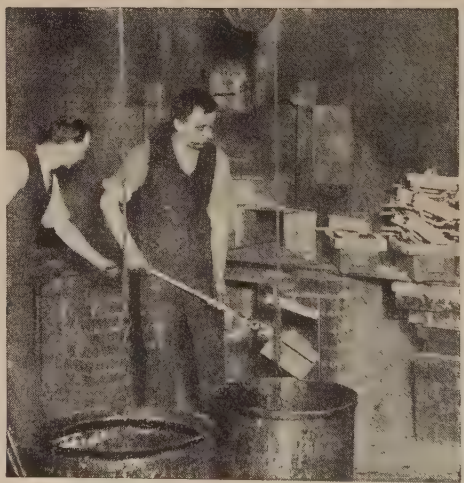
HOW STEEL PENS AND NIBS ARE MADE



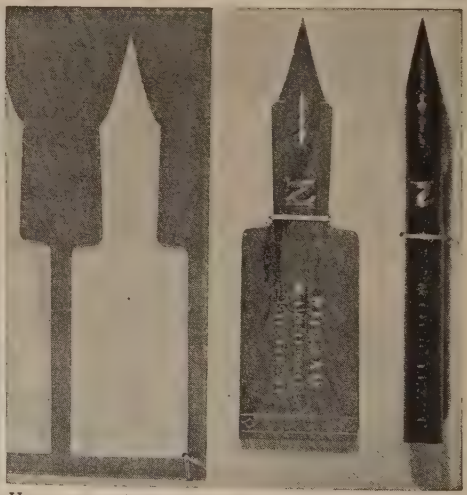
Steel pens go through sixteen processes, some of which are shown on this page. Here we see the steel from which the pens are made, and the annealing pots, or boxes in which strips of the metal are heated and softened.



In these pictures we see the strips of steel being rolled, in readiness for the stamping out of the pen shapes. This rolling process makes the strips of steel uniform in thickness to the ten-thousandth part of an inch.



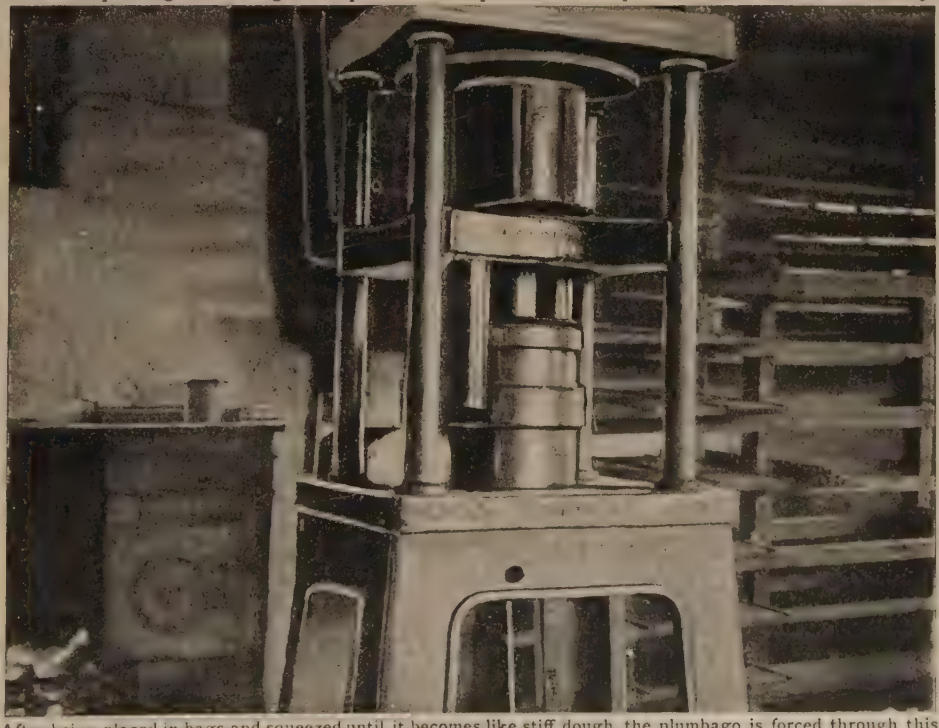
The shapes are stamped out, heated in furnaces, and then put into vats of oil to harden them. as shown here.



Here we see the metal, and the shape stamped from it. The pen, quite ready for use, is shown on the right.

HOW WE GET OUR LEAD PENCILS

A lead pencil, which we stupidly call by that name though it contains no lead, is really made of a material called graphite, or plumbago. This is dug out of the earth, and consists of carbon and other things, but not of lead. The plumbago has to be ground up fine in these presses and the powder mixed with water and clay.



After being placed in bags and squeezed until it becomes like stiff dough, the plumbago is forced through this pressing machine. Down the centre of the machine runs a strong tube. The paste is driven down this tube, which makes it into long, slender sticks. We see the stick of plumbago coming out under the part marked with a black spot on the machine. That is the pencil without its covering of wood, which has now to surround it.

THE PENCIL IS PUT INTO ITS CRADLE

The wood for the pencil is from the Virginia or Florida cedar-tree, which is soft, has a straight grain, and is easily cut. The tree is cut up into logs, and then taken to the factories. The logs are split into smaller pieces, and then a machine cuts these into long, straight, square strips of wood, all of the same length.

The strips of cedar wood are then passed through a machine which cuts out a groove on the upper side. The grooved pieces of wood are laid on the bench of a man who has a number of pieces of plumbago, or "black-lead," ready. He fills each groove with a piece of this, having first put a little glue on the lead to make it stick in its place. The cradle, with the lead, is now ready to have the other wooden part of the pencil fastened over it.

THE SQUARE PENCIL IS MADE ROUND

The wood of the pencil is not in two equal parts. That which is grooved to receive the lead is thicker than the other. The second piece is not grooved, but is flat. The part containing the plumbago goes to another man, and he lays on the flat portion of the wood, and neatly glues both together. The result is a square pencil. Another machine is now necessary to plane the pencils and make them round, or flat-sided, and even.

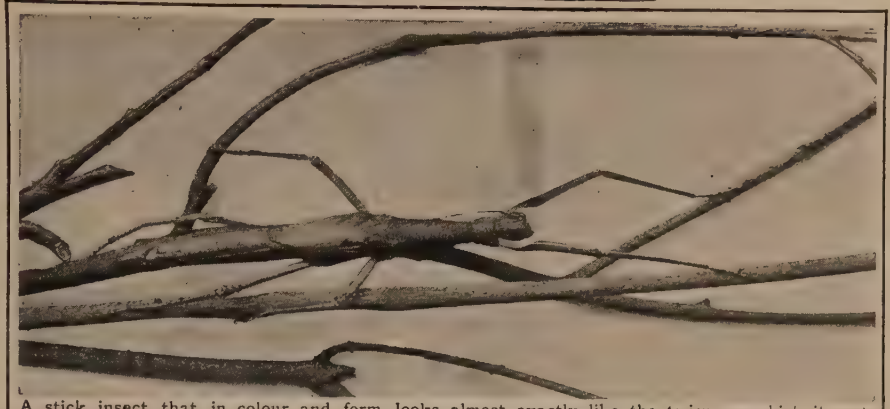
Having been shaped and reduced to the proper thickness, the pencils come in long sticks to the workshop, where they are made nice to look at and to handle. They have to be stained and polished to make them pretty, as well as useful. Nobody would like to use a rough, ugly-looking pencil, and it is easy to make them neat and pleasant to hold. Some are coloured red, others yellow, brown, or black, and then they are stacked.

THE PENCILS ARE READY FOR SCHOOL

All this time the pencils are very long, for it would be a waste of time to make them in short lengths. They are now placed in a little machine; and a man, by pulling a lever, causes a strong blade to come down and cut each long pencil into two, or three, or more, of the right size for using. The process is the same for all pencils.

The only manufacturing process remaining is to stamp upon the pencils the letters showing whether they are hard, hard and black, soft, or soft and black. Then the manufacturer's name is stamped on, and the pencils are made up into bundles of dozens, packed up in boxes, and are ready to go to the shops and the schools.

THE NEXT PICTURES OF FAMILIAR THINGS ARE ON PAGE 3439



A stick insect that in colour and form looks almost exactly like the twigs on which it rests

ANIMALS WITH WONDERFUL COATS

CONTINUED FROM 3304

ARCTIC FOX

THERE is an old joke known to nearly all of us who have been to a circus. Two clowns enter the ring, and one says to the other: "Do you know how to catch a rabbit?" "Why, how should I catch a rabbit?" asks the other. "The best way to catch a rabbit is to sit behind a hedge and make a noise like a turnip," says the first clown in reply.

Now, none of us would play such a trick upon our friends as to say that in Nature's family creatures sit behind hedges and pretend to be turnips. That would be rather silly. But the idea of the old circus joke comes back to mind when we remember that insects perch on leaves and twigs, and pretend to be leaves and twigs. Shall we say "pretend to be"? No, that carries us too far. The wonder of the structure of the insects is sufficient as it is without our letting fancy run us into the danger of overstepping the bounds of common-sense.

The leaf insect and the stick insect are among the most wonderful examples of what we call protective mimicry, but we must not say that the insect deliberately plans its own colour. It would be just as incorrect to say that the ptarmigan deliberately changes its feathers to white in winter, or that the mountain hare deliberately alters the colour of its winter coat to match the snows among which it lives. It is by one of the great mysterious processes of Nature that these humble insects are able to make themselves like their surroundings; and it is by the operation of the same law that the giraffe and the tiger are able to become invisible among *their* surroundings.

The great white bear of the Polar regions did not get his white fur by thinking that it would be better for him to have a coat matching the snow of his native land. Man is the only living creature that can deliberately do these things. Man has a mind; he remembers yesterday, and last year, and the years before that, and he plans for the years that are to come. None of the creatures of the wilds are wise enough to copy the arts of man. Man, however, copies the animals.

One of the things that the lower orders of creatures have taught us is protective mimicry. In the old days, when our soldiers went forth to war, they wore their glaring bright uniforms. These showed up distinctly against the grass and rocks among which they had to fight. Nowadays, when we send out our soldiers to war we dress them in an inconspicuous uniform called by the Indian name khaki—a material which looks like the colour of the earth and rocks. We even paint the bright parts of the guns with khaki, so that they shall

not glisten and prove a mark for the sharpshooters of the enemy. This is a recent change in war, but in the lives of the lower creatures it has been practised for perhaps millions of years.

It has not come suddenly. It was not done in a day or a night, nor in a year. Take the case of the humming-bird moth. That is so marvellously like the humming-bird that men have shot it in mistake for the bird. That seems rather a queer sort of "protection" for the moth. But those moths were there long before men and guns appeared. In the old days they were persecuted by insect-eating birds and other creatures. Then it would happen that one or two moths were born different from the others. They would be larger, and look a little like a bird. Their likeness to the bird and their larger size would lead to their being spared by birds, which mistook them for something else. Naturally, then, the young ones of these would be like their parents, and would have a better chance of rearing young ones.

MOTHS THAT LIVE SAFELY BY PRETENDING TO BE BIRDS

Gradually the moths that were like birds, if they mated with other moths like themselves, would become a definite species. They would survive the perils which the others were unable to avoid. The old stock—the moths which looked simply like moths—would die out. They would find it impossible to live, because the more the other moths increased, the more would those of the original type be sought as food. So in course of time the first strain would become extinct, and those which had imitated the humming-birds would possess the whole part of the country where the others had been. They would survive, because they were the fittest to survive, because, by unconsciously imitating birds, they had deceived their enemies.

And what is true of the gradual formation of the species of humming-bird moths is true also of the other wonderful creatures which live by trickery. Their art is the outcome of ages and ages of development. The improvement has come little by little, and the change of form, very slowly effected, has become permanent, because it is necessary for the very life of the creature benefited by it. That is the thing we have all to remember — that these resemblances of forms of animal life to their surroundings, or to other and better-protected forms of life, are always brought about because they are necessary for the well-being of the creatures affected. There is a cause for everything that happens in Nature, of which all who will may discover at least something.

WHY ONE BIRD BECOMES WHITE IN WINTER, AND ANOTHER REMAINS BLACK

Those of us who have followed the CHILD'S BOOK OF NATURE from the beginning to the present point have noticed repeated instances of the manner in which animals, birds, fishes, reptiles, and insects are safeguarded in this way. On the other hand, careful observers will have noted that there are striking exceptions. It is only fair, when we are stating a general and important rule, that we should grapple, as far as we are able, with the difficulties which exceptions seem to present. Let us see if we can answer, in advance, some of the questions to which this story may give rise.

Why should a ptarmigan be able to change its plumage to pure white amid the snows of the Highland winter, when the relatives in the Arctic snow of our friends, the ravens, have to show themselves in glossy black, winter and summer? That is a fair question. The answer seems to be this: that the ptarmigan has need of its white plumage in winter so that it may seek its food in safety upon the moors and hills, without being discovered by its enemies, as it quickly would be, were it to wear its summer garb of coloured feathers. The raven, on the other hand, does not seek its food from things growing upon the ground. It feeds on carrion, and is free to fly wheresoever it will. Therefore, it is not in need of protection such as is necessary for the very life of the ptarmigan. It need not fear death through being plainly visible on the snow.

WHY THE SABLE DOES NOT CHANGE HIS BROWN COAT IN THE SNOW

A stronger contrast, however, is presented by the Polar bear and the sable. The Polar bear lives in the Arctic regions, and the sable lives in bitterly cold Siberia. Siberia has a generous summer, but the cold there brings snow and ice in winter almost as bad as that of the Arctic regions. Why, then, cannot the sable change his coat to white in

INSECTS THAT PRETEND TO BE PLANTS

The stick insects are among the greatest marvels of Nature. As we may see from this one that is common in Ceylon, the creatures bear a remarkable resemblance to the twigs of the trees on which they rest.

Some of the stick insects are thirteen inches long, and yet so closely do they resemble twigs that it is often impossible to discover them even when looking straight at them. This picture shows a stick insect from Brazil.

Some of the largest stick insects are found in Brazil, but quite as wonderful is another insect common in that country that exactly resembles the thorns of the plants on which it rests, as may be seen in this picture.

The Indian leaf butterfly, shown here, has the upper surface of its wings very gaudy and conspicuous, but when it rests it closes its wings, and is then, in shape and colour, almost an exact copy of a withered leaf.

There is an insect in Mozambique that closely resembles a flower, as may be seen here. It pretends to be an orchid, in order to obtain food, for when butterflies visit the supposed flower they are quickly seized.

winter, instead of living always in the rich brown fur which is so famous and so costly? The Arctic fox and the ermine, like the bear, change theirs. The Polar bear, indeed, is white all the year round, the only bear to enjoy this distinction. Snow and frozen waters are always to be found in the Arctic regions, winter and summer, hence it would be a disadvantage for the Polar bear, which seeks seals and fish, to change his coat in summer. The Arctic fox, on the other hand, strays farther from the sea with its ice, and from the fields which are always covered with snow; so that it *is* to his advantage to change his colour with the seasons.

How, then, about the sable? The reason that he does not alter his colour in winter or summer is this: when snow and ice abound in winter, the sable has to seek his living in the bushes and trees. He is very hungry, and eats a vegetable and meat diet. In the bushes and trees he finds berries which help to make up his meal. He is thankful for these; but still more welcome to him are the birds which he is able to catch.

HOW THE CUNNING SABLE HIDES IN THE TREES AND CATCHES BIRDS

Now, if the coat of the sable were white, like the snow, he would be easily detected as he creeps along the branches. With his brown fur, however, he is not readily distinguished from the trees and bushes along which he makes his way. Therefore, being so protected from observation, he is able to pounce upon unwary birds that would otherwise be beyond his reach. His colour is the means of his being able to get the food necessary for his existence. If he were white, very likely he would starve, for the berries alone would not suffice to feed him.

Then there is the musk-ox, whose dingy, shaggy coat is always plainly seen against the snow—whence comes his protection from colour? The plainness with which he can be seen is not a source of danger to him, but of protection. Left alone, a musk-ox, gallantly as he might fight, would soon become the prey of savage, hungry animals. He may be brave, but he cannot alone resist the attacks of animals with powerful, tearing teeth. But a herd of musk-ox together might defy quite powerful enemies. Therefore, in case of danger, it is necessary that the musk-ox should be able readily to see his comrades, so that he may rush to them. He can easily see them in their dark coats, but he could not if their coats were white like the snow.

A WONDERFUL INSECT THAT CAN MAKE ITSELF LOOK LIKE A LEAF

Having answered these questions, let us return to our insects, and see if the marvels of the leaf insects and stick insects stand alone in the story of Nature's miracles. We shall soon find that they do not. The leaf insects and stick insects seem to have reached the highest stage of perfection in protective mimicry, but the defences of other weak little creatures are found equally wonderful in their way. But let us first discuss these wonderful stick and leaf insects.

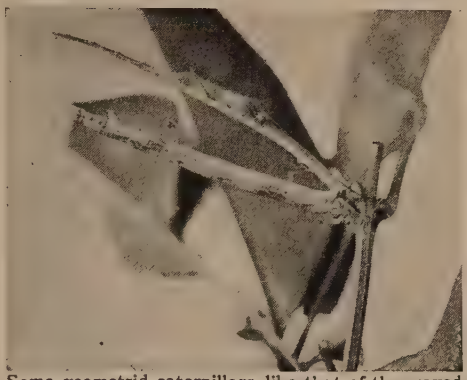
A curious thing is the way in which the natives are deceived by the leaf insect. Its home is in the hot countries; it is found, for example, in perfection in Ceylon. Now, the eyesight of natives is generally sharper than that of Europeans. Living a savage or partly savage life, they become very keen-sighted, for their success in gaining food depends very largely upon the keenness of their vision. If, then, the leaf insect manages to deceive the native hunters, we may rest assured that it is indeed a wonderful creature.

And it does deceive them completely. They believe that the leaf insect is really part of the plant on which they discover it. It grows like a leaf, they say, and is really part of the leaf for the early stages of its life, and then, when it reaches maturity, it loosens itself from the plant and flies away. Of course, that is a mistake. A tree or plant may feed an insect, but life comes from the Power which created the tree. We might just as well say that the caterpillar of the clothes-moth is created by the cloth or fur in which it is born. But we can forgive the natives for their error.

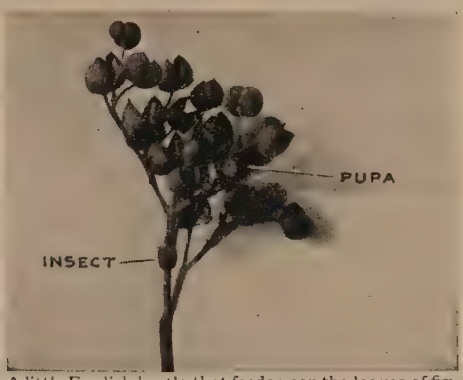
HOW THE LEAF INSECT DECEIVES THE CLEVEREST OF MEN

When English naturalists first studied the leaf insects, they said: "To such perfection has Nature carried her arts in these insects, that you would declare, upon seeing some of the insects, that they had robbed the trees of their leaves to form for themselves artificial wings,

HOW INSECTS DECEIVE THEIR ENEMIES



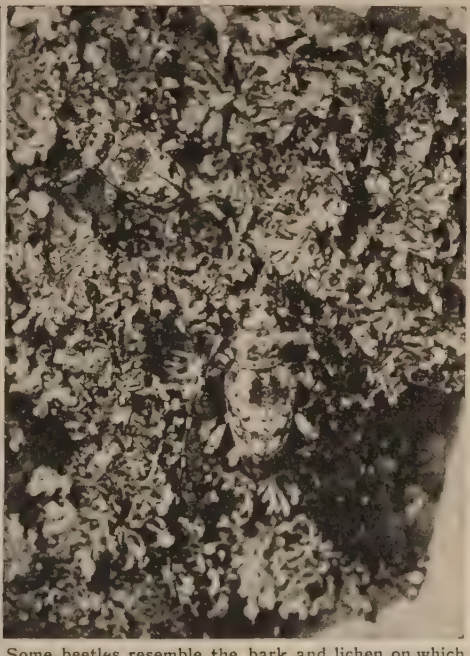
Some geometrid caterpillars, like that of the waved umber moth shown here, are known as stick caterpillars, because of their habit of imitating twigs.



A little English beetle that feeds upon the leaves of figwort, spins a cocoon for its pupa stage that resembles a seed capsule of the plant, and so escapes notice.

The comma butterfly, which gets its name from a white mark like a comma on its wings, is one known to almost every lad. The underside of the wings varies through all the browns and dull greens of faded leaves, and when the butterfly is at rest, as shown here, it is difficult to distinguish from a dead leaf.

This leaf insect from Ceylon exactly resembles a leaf, not only in its shape and green colour, but in its markings, which are just like the veins of a leaf.



Some beetles resemble the bark and lichen on which they rest. Here are two such beetles from the East Indies which are difficult to distinguish from the lichen.

so exactly do they resemble them in their substance and internal structure." Stick insects and leaf insects belong to the same family, but there is the same sort of difference between the two species that there is between the centipedes and the millipedes. The body of the stick insect is narrow, and shaped like a cylinder; the body of the leaf insect is broad and flat. The leaf insect is coloured exactly like the leaves among which it rests. The abdomen is broad and flat, and green or dark yellow. If it lives among green leaves, the body will be found to be green; if the leaves be withering, the leaf insect will look just the same colour as the foliage, dried up and withered, as it seems. The legs are broad and leaf-like, so that they pass for parts of the leaves. But perhaps the wings are the most wonderful. In every respect they resemble the leaf of a tree or shrub.

Let us study the picture of the green insect from Ceylon on page 3411. We can hardly tell where the real leaf ends and the insect begins. Down the centre there appears to be the main nervure of the leaf, and branching off to right and left there seem to be lesser nervures. The shading of the wing-sheaths is exactly like that of the leaf.

THE LEAF INSECT'S WINGS THAT CHANGE COLOUR LIKE A DYING LEAF

How does the insect get this extraordinary resemblance to the leaf? The trick is effected by Nature, by means which might seem almost to justify the mistake of the natives. The colouring is the result of what is known as chlorophyll, which is the green colouring matter of plants. The formation of the elytra, or wing-sheaths, is similar to the construction of the leaf of the plant. The resemblance is not only on the surface, but, more wonderful, in the internal structure of the insect. Even when the life of the insect ends, the resemblance does not depart. One such insect which has passed its life among green leaves would always remain, when alive, green like the plants; but when it dies, the body of the insect changes colour exactly like a dead leaf.

The food of the leaf insect which we have been considering is the leaf which it resembles. But there is another species of leaf insect which does not rely upon this sort of diet. This one, which flourishes in Mozambique, is a flesh-eater. Its food consists of butterflies and other insects. So the insect has to practise to deceive its victims into the belief that it is something else than a hungry, carnivorous animal. This it manages to do by imitating the orchid.

AN INSECT THAT PRETENDS TO BE A FLOWER AND FEEDS ON BUTTERFLIES

Its colour and form resemble the flower of a beautiful orchid. It settles upon an orchid and rests quite still. Butterflies approach in the belief that the insect forms part of the orchid from which they desire to extract nectar. In an instant the insect starts up, catches the butterfly, and eats it.

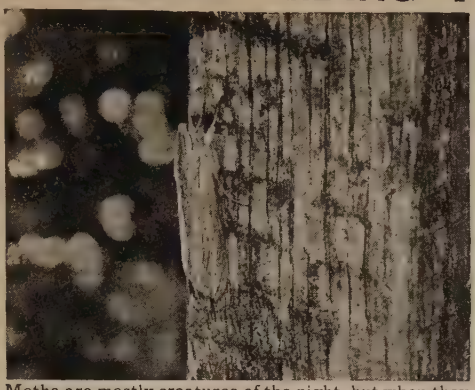
These two species of insects give us the story in a nutshell of the whole scheme of mimicry. One is coloured to resemble plants, so that it may escape the attacks of stronger creatures which would destroy it. The other is coloured to resemble a flower, so that it may be mistaken for something quite harmless by creatures upon which it depends for food. And throughout wild Nature this plan works in these two directions. The lion and tiger are coloured to resemble their surroundings so that their intended victims may not see them; the humming-bird moth and the leaf insects, and all the lesser creatures that need protection, are coloured and shaped so that they may go their way through life always being mistaken for something else by the things that would eat them.

After having admired the wonders of the leaf insect we cannot be more astonished by other creatures, but we have to admit that the claims upon our admiration of the stick insects are just as strong. They are as marvellously protected in their way as leaf insects are.

A WONDERFUL INSECT THAT RESTS IN A TREE AND DISAPPEARS BEFORE OUR EYES

In fact, some of them might fairly challenge the leaf insects for the right to be considered the best actors in Nature. Think of a great insect thirteen inches long—three inches longer than this page—resting on a shrub within a few inches of our eyes and being invisible, though fully exposed to view. There is the insect, right before us, but we peer and turn about

MOTHS HIDING FROM THEIR FOES



Moths are mostly creatures of the night, but when they appear in daylight they escape from enemies by their resemblance to their surroundings. This shark moth is remarkably like the wooden paling on which it rests.

The small engrailed moth, shown in this picture, is grey and brown in colour, mottled with darker shades, and as it rests on an oak paling it looks exactly like a patch of lichen, or other natural discoloration of the wood.

The grey shoulder-knot moth, shown here, first appears in autumn. It is pale grey with black markings, and its colours so harmonise with the trunk of the oak on which it rests that it is seen only by close scrutiny.

The marvel du jour moth is, in colour, bright green and white, with black markings; but it passes unnoticed by its enemies, because it rests upon the bright green lichen on tree-trunks, with which its gay colours harmonise.

The caterpillar of the red underwing moth is so like the trunk of the poplar on which it lives that it is discovered by touch more often than by sight.

The red underwing moth itself is also splendidly protected, for though large and handsome when the wings are expanded in flight, its upper wings, that show when at rest, exactly resemble a tree-trunk or discoloured masonry.

The dark dagger moth, that is very like the commoner grey dagger, is hard to discover, because of its resemblance to its surroundings when at rest.

The photographs on these pages are by H. Irving, A. E. Tonge, and Percy Collins.

to discover it, and peer in vain. A gentleman who had a couple of these insects alive took some friends to see them. He took them close to a tree. "There they are," he said, "they are both there," and he nodded his head in the direction of the tree. The friends stared until their eyes ached, then turned to him with a smile, thinking that he was playing a trick on them. "I assure you that they are there, right before your eyes," he said.

THE WONDER OF THE STICK INSECTS THAT ARE SEEN AND YET UNSEEN

They gave it up, and though they were close up to the tree, he had to point with his finger to the insects before the untrained eyes of his friends could discover them. Once he had touched them the stick insects were plainly visible. But how wonderful that people who had gone out solely to see them, and had stood close to them, should be unable to tell them from the twigs of the tree! So it was, and so Nature intended that it should be.

Of course, if the insects were flying, they would be readily seen. Not all of the species have wings, but some have two pairs of wings, a small pair in front and a larger pair at the rear. But here we have cause for more wonder. When the wings are open, it is found that the hinder pair have half their surface brightly coloured, while the other half is quite plain. The extended wings, so gay and handsome, are easily to be seen. But the insect comes to rest as we watch, and, lo! there is nothing to be seen. We see twigs and stems, but no insect. Where is the brightly coloured insect which we saw flying a moment ago? The explanation is that the smaller pair of wings is folded down over the front part of the hinder wings, and looks just like the rest of the body. The second pair of wings, however, shows no colour; they cannot be distinguished from the rest of the body.

A MARVELLOUS TRANSFORMATION SCENE IN AN INSECT'S LIFE

Now we understand why half the lower wings are coloured and half plain. The coloured part is folded up and covered by the half which is plain, and now not the sharpest eye could detect the presence of wings at all. Instead of a gorgeous, winged insect which we saw a moment ago, we see what looks like a little branch of the shrub or tree. The whole body is long, slender, and round, and coloured like the wood of the tree. But the insect has long legs; how is it to dispose of these? The legs help to deceive, instead of betraying their owner. They are themselves shaped like twigs, and as we look at the insect we fancy that the body is a stoutish stem and the legs are merely thinner twigs branching out in different directions from an older stem.

So long as it remains still, the insect is not to be seen. When it moves, it is so remarkable in appearance that it well deserves its title of the "walking stick." Its home is on shrubs, or among undergrowth, or on the stems of tall grass. It rests by day and seeks its food by night, hence its life is probably as safe as that of anything in the insect world.

These two insects, being naturally sluggish in character, may be said to be specially favoured in their struggle for existence. The less they wander about, the less they are likely to be seen and caught. But there are other insects whose lives depend upon their getting about the world. They must find food for themselves, and they must find a suitable place in which to lay their eggs, or their race would perish.

HOW NATURE PROTECTS THE LIVES OF BUTTERFLIES AND MOTHS

The means of protection in their case is just as effective. We find this specially so in the case of moths and butterflies. We have studied this subject already, but as we have a picture of the famous leaf butterfly, we may refer to the matter again. Here is a beautiful butterfly which, when it is flying, is handsome as can be. But when it settles to rest on a tree, not the keenest human eye would readily find it. It raises its wings and brings them together, and there we have what appears one of the ordinary leaves of the tree. Its relative, the dead-leaf butterfly, chooses resting-places where its appearance suggests that it is a leaf which has died.

Luckily, we have not to go to India, or even to a zoo, for these remarkable sights; we may find a splendid example in the common lappet moth. The moths fold their wings differently from the butterflies, not up, but flat down on the back.

Now, this means a serious difference in the scheme of protection for the two. The butterfly, as he shows the underside of his wings when at rest, must have that side soberly coloured, and the gaudy hues all on top. The moth, on the other hand, showing the upper side of the wings when at rest, must be coloured underneath, not on the upper surface, or, when he settled down to rest, his life would not be worth ten minutes' purchase, as we say.

The lappet moth is not content to be merely soberly coloured on top of his wings; he is so formed that when he rests he looks exactly like a little cluster of dead leaves. Then we must not forget that there are moths and butterflies that resemble wasps and bees, so that, avoided by insect-eating creatures which fear the sting of the wasp and the bee, they escape destruction by their deceit.

Insects that look like thorns and beetles that look like moss

On page 3409 is a picture of a Brazilian insect, which, living among trees bearing thorns, looks so marvellously like a thorn itself that, though our photograph is taken at short range, we should hardly be able to tell the insect from the true thorn unless it were marked for us on the picture. Mosses and lichens serve as homes for many insects, as well as for coverings for the homes of clever birds which use moss and lichen to adorn and hide their nests. In the East Indies they have beetles which are coloured exactly like moss; and there is another creature, like a stick insect, called the moss insect, which looks exactly like a branching twig of some plant over which moss has grown.

We have been studying how insects are protected by natural colouring and disguise. Somewhere in their family history there must have been, according to this theory, a sort of choice by females of mates whose shape and colouring made them most like their surroundings. The result has been that their successors have become more and more like the leaves, and twigs, and moss, among which they make their dwellings, or more and more like the other insects, and other articles, whose appearance they have insensibly copied. The same sort of thing is constantly going on to-day. The insects that are best protected in this way are the insects that have the best chance of escaping hungry enemies, and so of rearing families of their own. The creatures that imitate other creatures have just the same sense of security from their disguise.

Living things that are not what they seem

The moths and butterflies that most nearly imitate things having an unpleasant taste, and therefore not likely to be eaten, are the most daring of their family. They fly, without haste and without care, in the sunlight, or in the light of evening, where insect-eating birds abound. They know that they need not fear, because by their appearance they are deceiving their enemies into believing that they are not good for food. The butterflies and moths are not the only forms of animal life to do this, of course. There is a winged bug which goes about disguised as a hornet; there is a caterpillar which pretends to be a stick; there is a timid little oriole which has managed to make itself like the powerful friar-bird, and so escapes. The cuckoo wears something the look of the fierce sparrow-hawk, and by its formidable appearance is able to frighten from their nests the little birds among whose eggs the cuckoo determines to place her own.

Few of us would, at first thought, suspect the frog of protection of this sort. We know that our toads and frogs in this country, if they rest still in their abiding place, are very hard to distinguish from their surroundings; but we know also that they are bound to hide and to mask themselves in this manner lest they should be gobbled up by ducks, or other birds, that like frogs and toads. But there is one bold little frog in San Domingo that does not hide.

A little frog with a red coat that is afraid of nothing

Among frogs coloured like dead leaves and green leaves, or resembling clods of earth, this daring little frog hops about among the enemies of frogs, as comfortably as if he were lord of the whole scene. The others dare not move by daylight, but this one, coloured as gaily as vivid red and blue can make him, hops about in the broad daylight. A naturalist, who was puzzled by this, caught some and took them home, and

gave them to his poultry. The birds, though they liked ordinary frogs, would not touch these scarlet-coated creature. At last, however, by throwing down meat, for which the birds eagerly scrambled, the gentleman managed to get a duck to snatch up one of the frogs. But in an instant the duck dropped it, and ran about shaking its head as if something horrible had entered its mouth. That is why that bold little frog goes out by daylight, fearless of birds and snakes and all the other enemies of frogs—it tastes too bad to be eaten, and it is therefore afraid of nothing.

This case, like the others, is one in which the protection is afforded by Nature. There are cases, however, where the insect has to take means of protection just as the caddis worm, the crab, and the hermit crab have to. There is a little insect that lives on the fig-wort which, when it spins its cocoon and enters the pupa stage, becomes, of course, entirely defenceless, and unable to run away from any enemy which may threaten it. But the wise little creature makes its cocoon so much like the seed of the fig-wort that it escapes detection.

AN INSECT THAT DRESSES IN A DIRTY COAT AND PLAYS THE BOGEY MAN

Even that is not so strange as the tricks of an insect called the *reduvius personatus*. This insect, in its perfect state, has wings; but in its early life it has not. In these early days, then, it is exposed to many perils. What is it to do to escape? It does the strangest thing. It drags itself through the old webs of spiders, covers itself with web and dust, and makes itself a monstrous size and most unpleasant in appearance. It is really the bogey man of insects. In this disguise it is quite secure. When the time comes for it to have wings, and so be safe, it brushes off the covering of dirt and web, and comes forth quite a neat and handsome insect.

But it is not by mimicry alone that insects are protected. Some of them are worse than our spitting friend, the llama—they shoot out acid. The most famous of these marksmen is the bombardier beetle, which, when threatened, squirts from its body a liquid which resembles nitric acid. Not only can it shoot strongly; it can make a report with its shooting like the tiniest of tiny guns. This report, which must sound quite loud to the senses of an attacking insect, is at once taken up by the whole family of bombardiers who may happen to be on the spot at the time, and away they fire, bang! bang! bang! as if the intruder had stumbled upon a whole battery of insect cannons. The bombardier can fire from twelve to twenty shots in succession, and after a rest is ready for another cannonade.

SPIDERS THAT PRETEND TO BE DEAD AND CATERPILLARS THAT THROW OUT POISON

This is a very effective weapon, and it serves the bombardier and other creatures that practise it in the place of the power to feign death. Perhaps the spiders are the finest masters and mistresses of the latter art. They curl up in an instant if threatened, and will rest under the closest examination, looking as dead as a door-nail.

The caterpillar of the puss moth should be handled with extreme care, for it possesses in exceptional degree the power to squirt forth its hateful poison. One day a gentleman who did not heed this fact went to look at some puss moth caterpillars which he had put away in a box with some leaves of the sort that they like. The moment he raised the lid, one of the caterpillars squirted forth a jet of acid which entered the right eye of the gentleman. He felt the most dreadful pain, and had to rush away for a doctor, who told him that the poison was very powerful indeed, and such as seriously to injure the eyeball. The pain lasted for several hours, and not for days after was he able to see properly.

Some caterpillars that cannot squirt acid are armed with hairs that produce an irritating rash upon us if we get them on the face or body. The hairs are the armour of those caterpillars, and serve so well for defence that the cuckoo is practically the only bird which will eat them.

THE PROTECTING CARE OF NATURE OVER ALL HER CHILDREN

Such, then, are some of the ways in which Nature protects the humblest of her children. The same thing happens in the desert as in the tropical forest, in the snows of the Arctic regions, and in the warm seas of the tropics. Everywhere we find the same rule in force for the benefit of wild animal life.

The next stories of Nature are on 3675.

A POEM ABOUT THE VIKINGS

THIS fine poem suggests something of the fierce spirit of the Vikings, those warriors of the sea whose home was in that part of Europe we call Scandinavia. When a Viking chief died, his body was placed in a boat, which, with full sail set and a fire lighted, was sent drifting out to sea. As the fire consumed the vessel and the body of the dead, it was supposed that the chief thus made his last journey, entering into Valhalla, the land of the gods. In this stirring poem of King Balder's funeral voyage, the tragic interest is the greater from the fact that the king is not dead when he sets sail for Valhalla, but is voluntarily going forth to his fate. The king is named after one of the gods in the Norse mythology, and we must admire the indomitable spirit of these old pagans, whose stories of their imaginary gods are full of a beautiful bravery. This poem was written by Charles Mackay, a well-known poet and journalist, who was born in 1814 and died in 1889.

THE SEA-KING'S BURIAL

CONTINUED FROM 3350

"My strength is failing fast,"
Said the sea-king to his men,
"I shall never sail the seas
Like a conqueror again,
But while yet a drop remains
Of the life-blood in my veins,
Raise, oh, raise me from my bed;
Put the crown upon my head;
Put my good sword in my hand,
And so lead me to the strand,
Where my ship at anchor rides
Steadily;
If I cannot end my life
In the crimsoned battle-strife,
Let me die as I have lived,
On the sea."

They have raised King Balder up,
Put his crown upon his head;
They have sheathed his limbs in mail,
And the purple o'er him spread;
And amid the greeting rude
Of a gathering multitude,
Borne him slowly to the shore—
All the energy of yore
From his dim eyes flashing forth—
Old sea-lion of the North—
As he looked upon his ship
Riding free,
And on his forehead pale
Felt the cold, refreshing gale,
And heard the welcome sound
Of the sea.

They have borne him to the ship
With a slow and solemn tread;
They have placed him on the deck
With his crown upon his head,
Where he sat as on a throne;
And have left him there alone,
With his anchor ready weighed,
And his snowy sails displayed
To the favouring wind, once more
Blowing freshly from the shore,
And have bidden him farewell
Tenderly,
Saying: "King of mighty men,
We shall meet thee yet again,
In Valhalla, with the monarchs
Of the sea."

Underneath him in the hold
They had placed the lighted brand;
And the fire was burning slow
As the vessel from the land,
Like a stag-hound from the slips,
Darted forth from out the ships.
There was music in her sail
As it swelled before the gale,
And a dashing at her prow
As it cleft the waves below,
And the good ship sped along,
Scudding free;
As on many a battle morn
In her time she had been borne,
To struggle, and to conquer
On the sea.

And the king with sudden strength
Started up, and paced the deck,
With his good sword for his staff,
And his robe around his neck.
Once alone, he raised his hand
To the people on the land;
And with shout and joyous cry
Once again they made reply,
Till the loud, exulting cheer
Sounded faintly on his ear;
For the gale was over him blowing
Fresh and free;
And ere yet an hour had passed,
He was driven before the blast,
And a storm was on his path,
On the sea.

"So blow, ye tempests, blow,
And my spirit shall not quail;
I have fought with many a foe,
I have weathered many a gale;
And in this hour of death,
Ere I yield my fleeting breath—
Ere the fire now burning slow
Shall come rushing from below,
And this worn and wasted frame
Be devoted to the flame—
I will raise my voice in triumph,
Singing free;
To the great All-Father's home
I am driving through the foam,
I am sailing to Valhalla,
O'er the sea.

"So blow, ye stormy winds—
And, ye flames, ascend on high;
In easy, idle bed
Let the slave and coward die!
But give me the driving keel,
Clang of shields and flashing steel;
Or my foot on foreign ground,
With my enemies around!
Happy, happy, thus I'd yield,
On the deck or in the field,
My last breath, shouting 'On
To victory.'
But since this has been denied,
They shall say that I have died
Without flinching, like a monarch
Of the sea."

And Balder spoke no more,
And no sound escaped his lip;
And he looked, yet scarcely saw
The destruction of his ship,
Nor the fleet sparks mounting high,
Nor the glare upon the sky;
Scarcely heard the billows dash,
Nor the burning timber crash;
Scarcely felt the scorching heat
That was gathering at his feet,
Nor the fierce flames mounting o'er him
Greedily,
But the life was in him yet,
And the courage to forget
All his pain, in his triumph
On the sea.

Once alone, a cry arose,
Half of anguish, half of pride,
As he sprang upon his feet,
With the flames on every side.
"I am coming!" said the king,
"Where the swords and bucklers ring—
Where the warrior lives again,
Where the souls of mighty men—
Where the weary find repose,
And the red wine ever flows.
I am coming, great All-Father,
Unto Thee!
Unto Odin, unto Thor,
And the strong, true hearts of yore—
I am coming to Valhalla,
O'er the sea."

*UNCLE SAM'S YOUNG ARMY

This stirring little piece comes from the pen of Mrs. Lilla T. Elder, and has a wonderful swing of enthusiasm in its lines.

We are Uncle Sam's young army,
And we're twenty million strong—
All together we are marching,
Marching, marching right along.
Not one coward is among us,
Every heart is staunch and true;
And although we are but children,
Yet there's something we can do:
We can guard our country's colours,
Raise them high with cheer and song.
For we're Uncle Sam's young army,
And we're twenty million strong.

Well we know the splendid stories
Of the brave deeds of the past,
And our country we have promised
That such bravery shall last.
Loyal we will be and love her,
True in every word and deed,
That we may be worthy of her
When it comes our turn to lead.

Now we can but guard her colours,
Proud that to us they belong:
For we're Uncle Sam's young army,
And we're twenty million strong.

And although the smoke of battle
Shadows our dear land to-day,
Still we little colour-bearers
With the flag can light the way.
See, how glad are all to cheer it.
Praises come from every mouth.
One great nation kneels to bless it,
East and West and North and South.
All together we are marching,
Marching, marching right along—
For we're Uncle Sam's young army,
And we're twenty million strong.

THE LAME BROTHER

Mary Lamb, the sister of Charles Lamb, had a very sad life, and was subject to fits of mania. Her brother Charles devoted himself to watching over her and protecting her. Their literary labours together did much to brighten and make useful the life of the sister, who, though greatly inferior to her brother in literary gifts, had still a talent for pleasant and simple verse. Their elder brother, John, had been lamed in his youth, and these verses by Mary Lamb were, no doubt, suggested by the infirmity of her brother.

My parents sleep both in one grave;
My only friend's a brother.
The dearest things upon the earth
We are to one another.

A fine stout boy I knew him once,
With active form and limb;
Whene'er he leaped, or jumped, or ran,
Oh, I was proud of him!

He leaped too far, he got a hurt,
He now does limping go—
When I think on his active days,
My heart is full of woe.

He leans on me, when we to school
Do every morning walk;
I cheer him on his weary way,
He loves to hear my talk:

The theme of which is mostly this,
What things he once could do.
He listens pleased—then sadly says,
"Sister, I lean on you."

Then I reply, "Indeed you're not
Scarce any weight at all—
And let us now still younger years
To memory recall.

"Led by your little elder hand,
I learned to walk alone;
Careful you used to be of me,
My little brother John.

"How often, when my young feet tired,
You've carried me a mile!
And still together we can sit,
And rest a little while.

"For our kind Master never minds,
If we're the very last;
He bids us never tire ourselves
With walking on too fast."

* Copyright by S. E. Cassino & Co., 1899.

A CHRISTMAS CAROL

There's a song in the air!
There's a star in the sky!
There's a mother's deep prayer
And a baby's low cry!
And the star rains its fire while the Beautiful sing,
For the manger of Bethlehem cradles a king.

There's a tumult of joy
O'er the wonderful birth,
For the virgin's sweet boy
Is the Lord of the earth.
Ay! the star rains its fire and the Beautiful sing,
For the manger of Bethlehem cradles a king.

In the light of that star
Lie the ages impearled;
And that song from afar
Has swept over the world.
Every hearth is aflame, and the Beautiful sing
In the homes of the nations that Jesus is King.

We rejoice in the light,
And we echo the song
That comes down through the night
From the heavenly throng.
Ay! we shout to the lovely evangel they bring,
And we greet in his cradle our Saviour and King.

— Josiah Gilbert Holland.

THE CHILDREN'S HOUR

This is one of the most charming of the minor poems by H. W. Longfellow, and it pictures for us with real feeling one of the greatest joys of life: the story-telling hour with the little ones. The story of the Bishop of Bingen, mentioned in the fourth verse, is told at length in Southey's poem of "Bishop Hatto."

Between the dark and the daylight, when the night is beginning to lower,
Comes a pause in the day's occupations, that is known as the Children's Hour.
I hear in the chamber above me the patter of little feet,
The sound of a door that is opened, and voices soft and sweet.

From my study I see in the lamplight, descending the broad hall stair,
Grave Alice, and laughing Allegra, and Edith with golden hair.
A whisper and then a silence; yet I know by their merry eyes
They are plotting and planning together to take me by surprise.

A sudden rush from the stairway, a sudden raid from the hall!
By three doors left unguarded they enter my castle wall!
They climb up into my turret o'er the arms and back of my chair;
If I try to escape they surround me; they seem to be everywhere.

They almost devour me with kisses, their arms about me entwine,
Till I think of the Bishop of Bingen, in his Mouse-tower on the Rhine!
Do you think, oh, blue-eyed banditti, because you have scaled the wall,
Such an old moustache as I am is not a match for you all?

I have you fast in my fortress, and will not let you depart,
But put you down into the dungeon in the round-tower of my heart.
And there will I keep you for ever, yes, for ever and a day,
Till the walls shall crumble to ruin, and moulder in dust away.

HOW TO WRITE A LETTER

In the early years of last century, when children's books were very quaint productions, chiefly concerned with illustrating the awful results of naughty conduct, a Mrs. Elizabeth Turner wrote many of these little works, such as "The Cowslip" and "The Daisy," which were meant to be "cautionary" stories for children, but to-day would be more likely to amuse young readers than to caution them. The following verses by Mrs. Turner, however, are quite happy, and may be commended as the best possible advice to those who find it difficult to write a letter—young and old alike. Mrs. Turner died in 1846 at the age of seventy-two.

Maria intended a letter to write,
But could not begin (as she thought) to indite;
So went to her mother with pencil and slate,
Containing "Dear Sister," and also a date.

"With nothing to say, my dear girl, do not think
Of wasting your time over paper and ink;
But certainly this is an excellent way,
To try with your slate to find something to say.

"I will give you a rule," said her mother, "my dear,
Just think for a moment your sister is here,
And what would you tell her? consider, and then,
Though silent your tongue, you can speak with your pen."

* GOD SENDS LOVE TO YOU

There are few stories in the Old Testament more beautiful than that of Naaman and the little Jewish maid Ruahmah, which tells us of how that young captive contrived to teach her master about the love of God. Dr. Van Dyke, an American poet of to-day, has written a beautiful play, entitled "The House of Rimmon," which deals with this subject, and Ruahmah is therein made to sing the following beautiful song.

Above the edge of dark appear the lances of the sun;
Along the mountain ridges clear his rosy heralds run;
The vapours down the valley go,
Like broken armies, dark and low.
Look up, my heart, from every hill
In folds of rose and daffodil
The sunrise banners flow.

Oh, fly away on silent wing, ye boding owls of night!
Oh, welcome, little birds that sing the coming-in of light!
For new, and new, and ever new,
The golden bud within the blue;
And every morning seems to say:
"There's something happy on the way,
And God sends love to you!"

* From "The House of Rimmon," copyright, 1908, by Charles Scribner's Sons.

SEVEN TIMES ONE

"Seven Times One" was written by Jean Ingelow, and is the first in a series of poems called the "Songs of the Seven." It tells the thoughts of a little girl upon her seventh birthday.

There's no dew left on the daisies and clover,
There's no rain left in heaven.
I've said my "seven times" over and over—
Seven times one are seven.

I am old—so old I can write a letter;
My birthday lessons are done.
The lambs play always—they know no better;
They are only one times one.

O Moon, in the night I have seen you sailing
And shining so round and low.
You were bright—ah, bright!—but your light is failing;
You are nothing now but a bow.

You Moon, have you done something wrong in heaven,
That God has hidden your face?
I hope, if you have, you will soon be forgiven,
And shine again in your place.

O Columbine, open your folded wrapper,
Where two twin turtle-doves dwell.
O Cuckoo-pint, toll me the purple clapper
That hangs in your clear green bell.

And show me your nest, with the young ones in it,
I will not steal them away.
I am old, you may trust me, linnet, linnet,
I am seven times one to-day.

THE KITTEN AND THE FALLING LEAVES

Although the subject of this poem by William Wordsworth is rather commonplace, the poet has treated it with a delicacy that makes it very interesting.

See the kitten on the wall,
Sporting with the leaves that fall,
Withered leaves—one—two—and three—
From the lofty elder-tree!
Through the calm and frosty air
Of this morning bright and fair,
Eddying round and round they sink
Softly, slowly: one might think,
From the motions that are made,
Every little leaf conveyed
Sylph or fairy hither tending,
To this lower world descending,
Each invisible and mute,
In his wavering parachute.
—But the kitten, how she starts,
Crouches, stretches, paws, and darts!
First at one, and then its fellow,
Just as light and just as yellow;
There are many now—now one—
Now they stop and there are none:
What intenseness of desire
In her upward eye of fire!
With a tiger-leap half-way
Now she meets the coming prey,
Lets it go as fast, and then
Has it in her power again:
How she works with three or four,
Like an Indian conjuror;
Quick as he in feats of art,
Far beyond in joy of heart.
Were her antics played in the eye
Of a thousand standers-by,
Clapping hands with shouts and stare,
What would little Tabby care
For the plaudits of the crowd?
Over happy to be proud,
Over wealthy in the treasure
Of her own exceeding pleasure!

THE BURIAL OF THE LINNET

Mrs. Ewing, who lived from 1842 to 1885, was in her day an extremely popular writer for the young, and many of her stories are still in circulation. She also wrote poetry, of which the following is an example, but she is better remembered for her charming stories of quiet everyday life.

Found in the garden dead in his beauty—
Oh that a linnet should die in the spring!
Bury him, comrades, in pitiful duty,
Muffle the dinner-bell, solemnly ring.
Bury him kindly, up in the corner;
Bird, beast, and goldfish are sepulchred there.
Bid the black kitten march as chief mourner,
Waving her tail like a plume in the air.
Bury him nobly—next to the donkey;
Fetch the old banner, and wave it about;
Bury him deeply—think of the monkey,
Shallow his grave, and the dogs get him out.
Bury him softly—white wool around him,
Kiss his poor feathers—the first kiss and last;
Tell his poor widow kind friends have found him:
Plant his poor grave with whatever grows fast.
Farewell, sweet singer! dead in thy beauty,
Silent through summer, though other birds sing.
Bury him, comrades, in pitiful duty,
Muffle the dinner-bell, mournfully ring.

TRY AGAIN

These familiar lines by William Edward Hickson have been as often quoted as some of the finest poetry in our language, although, of course, they are only rhymes for children. It is the idea here, rather than the form in which it is expressed, that makes the words worthy of quotation. Hickson wrote on educational matters, and lived from 1803 to 1870.

'Tis a lesson you should heed,
Try again;
If at first you don't succeed,
Try again;
Then your courage should appear,
For if you will *persevere*,
You will conquer, never fear,
Try again.
Once or twice, though you should fail,
Try again;
If you would at last prevail,
Try again;
If we strive, 'tis no disgrace
Though we do not win the race;
What should we do in that case?
Try again.
If you find your task is hard,
Try again;
Time will bring you your reward,
Try again;
All that other folk can do,
Why, with patience, may not you?
Only keep this rule in view,
Try again.

LITTLE VERSES FOR VERY LITTLE PEOPLE

ONE, two, three, four, five,
Once I caught a fish alive,
Six, seven, eight, nine, ten,
But I let him go again.

Why did you let him go?
Because he bit my finger so.
Which finger did he bite?
The little one upon the right.

POOR Dicky's dead! The bell we toll,
And lay him in the deep, dark hole.
The sun may shine, the clouds may rain,
But Dick will never pipe again!
His quilt will be as sweet as ours:
Bright buttercups and cuckoo flowers.

"LITTLE maid, pretty maid, whither goest thou?"
"Down in the forest to milk my cow."
"Shall I go with thee?" "No, not now;
When I send for thee, then come thou."

OH, my pretty cock! Oh, my handsome cock!
I pray you, do not crow before day,
And your comb shall be made of the very beaten gold,
And your wings of the silver so gray.

DANCE, little baby, dance up high,
Never mind, baby, mother is by;
Crow and caper, caper and crow,
There, little baby, there you go;
Up to the ceiling, down to the ground,
Backwards and forwards, round and round;
Dance, little baby, and mother will sing,
With the merry coral, ding, ding, ding!

UNDER the window is my garden,
Where sweet, sweet flowers grow;
And in the pear-tree dwells a robin,
The nearest bird I know.

Tho' I peep out betimes in the morning,
Still the flowers are up the first;
Then I try and talk to the robin,
And perhaps he'd chat—if he durst.

YOU see, merry Phillis, that dear little maid,
Has invited Belinda to tea.
Her nice little garden is shaded by trees,
What pleasanter place could there be?

There's a cake full of plums, there are strawberries too,
And the table is set on the green;
I'm fond of a carpet all daisies and grass,
Could a prettier picture be seen?

A blackbird (yes, blackbirds delight in warm weather),
Is flitting from yonder high spray.
He sees the two little ones talking together,
No wonder the blackbird is gay.

RUB-A-DUB-DUB,
Three men in a tub;
The butcher, the baker,
The candlestick-maker;
And they all jumped out of a rotten potato.

DIDDLEY-DIDDLEY-DUMPTY,
The cat ran up the plum-tree,
Half-a-crown
To fetch her down,
Diddley-diddley-dumpty.

My house is red—a little house,
A happy child am I:
I laugh and play the livelong day,
I hardly ever cry.

I have a tree, a green, green tree,
To shade me from the sun;
And under it I often sit,
When all my work is done.

My little basket I will take,
And trip into the town.
When next I'm there I'll buy some cake,
And spend my bright half-crown.

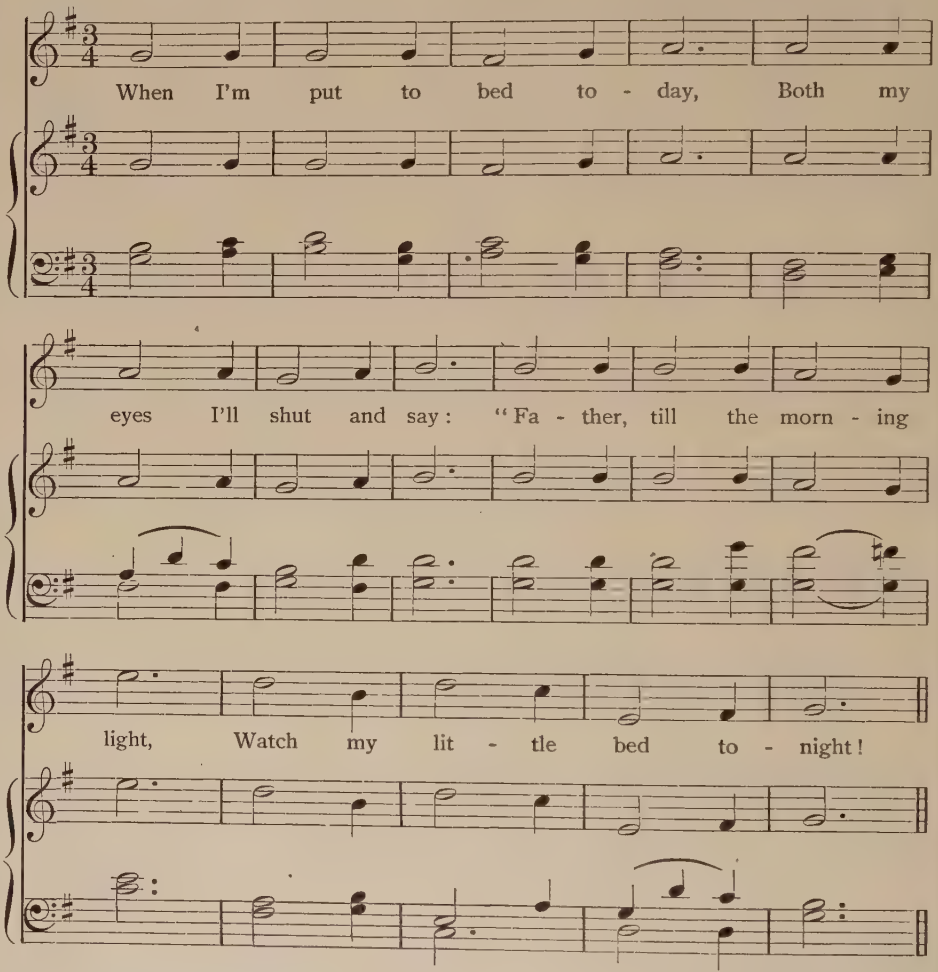
I love little pussy.
Her coat is so warm,
And if I don't hurt her,
She'll do me no harm.

So I'll not pull her tail,
Or drive her away,
But pussy and I
Very gently will play.

She will sit by my side,
And I'll give her her food,
And she'll like me because
I am gentle and good.

A CHILD'S EVENING PRAYER

Words by ALFRED P. GRAVES. Music by permission of MESSRS. SCHOTT & Co.



"All the people in all lands
Take unto Your loving hands;
Old and young and great and small,
From all danger guard them all!

"Give the sick ones gentle sleep,
Dry the eyes of those that weep,
And, please, leave the moon to light
All poor travellers through the night!"

READING

THE VERB AND ITS MOODS

CONTINUED FROM 3376

As I write this lesson, I am sitting by the sea, watching many boys and girls digging on the sands and paddling in the water. If I were to say to you, "I have just had a bath," I should be making a statement about something that I have just done. And if I were to ask you, "Have you had a bath?" I should be asking you a simple or direct question. But supposing I gave you an order, and said, "Go and have a bath," I should be no longer merely stating something, but I should be commanding you to go and do something. So, you see, there are at least two different *manners* or *ways* of talking about actions: (1) We can either make simple statements, or ask simple questions about them, as "The cow JUMPED over the moon," "The boy STOOD on the burning deck," "Who KILLED Cock Robin?" (2) We can tell people to go and do them, as "Polly, PUT the kettle on," "Zachariah, BLOW the fire."

Now, another word for *manners* or *ways* is MOODS, and so we call these two different MOODS of the verb. The first is called the IN-DI-CA-TIVE MOOD, because it indicates or points out; and the second is called the IM-PERA-TIVE MOOD, because it is imperial (like an emperor) and gives orders. Here are some more examples of the Imperative Mood:

"Little Boy Blue, COME, BLOW, on your horn."

"If at first you don't succeed, TRY, TRY again."

"TELL me the old, old story, (imperative)
For I FORGET so soon." (indicative)

"CHARGE, Chester, CHARGE! On Stanley, on," (imperative)
WERE the last words of Marmion. (indicative)

"Pat-a-cake, Pat-a-cake, Baker's man:
BAKE me a cake as fast as you can; (imperative)
STICK it, and PRICK it, and MARK it with B (imperative)
And SEND it home for Baby and me." (imperative)

"BE thou faithful unto death (imperative,
And I WILL GIVE thee a crown of life." (indicative)

Now, do you think you can pick out for yourselves the examples of these two MOODS in the following sentences? Try.

"Suffer little children to come unto Me, and forbid them not, for of such is the Kingdom of Heaven."

"Heap on more wood, the wind is chill."

"Snail, snail, put out your horns,
I'll give you bread and barleycorns."

"Hold the fort, for I am coming."

"Try not the pass, the old man said:
Dark lowers the tempest overhead."

There are 6 imperatives and 6 indicatives in those sentences. Have you found them all ?

Here are some lines that may help you to remember these two moods :

If you order a person to bring you some chalk,
Or tell him to eat up his food ;
Or bid him be seated or go for a walk,
You use the Imperative mood.

But when you are telling him what you have done,
Or asking him what are his views,
Or stating the fact that twice two are not one,
The Indicative mood you will use.

If you learn these little verses you will find that you will have no difficulty in discovering the moods of any verbs you come across from time to time.

WRITING

A NEW WAY OF WRITING FIGURES

"MOTHER, we wrote words with fourteen capital letters last time," said Nora, when she and Tom next came to their mother for a writing lesson.

"Then there are twelve more," observed Tom. "And we stopped at N, so we begin with O."

"That's right, Tom," said his mother. "Here are the words to be written now :"

Ox Poke Queen Robe
Sink Twist Uncle

"Q, R, and U join on nicely," said Nora, as she looked at these words. "T can't manage to join any better than the first G, and, mother, don't you think something might be done to help O ? The other letters were so kind to it before."

"Suppose we try, Nora," was the reply. "But mind that pen. If you knock it about so, the ink will drop on the tablecloth. It is safer to lay pens down when they are not being used."

Tom wanted to see what he could do for O, and this is what Nora and he managed by making the knot continue into the first part of the letter x :

Ox Ox Ox

Their mother pointed out that O joins more easily on to a looped letter like l, in this word "old" :

Old

Tom liked what he called T-square T, and asked to have a word beginning with that letter.

"It doesn't join on, Tom. See !" said his mother, as she wrote "Take."

Take

Meanwhile Nora had been thinking about capital S, and noticing how the pen ran round the lower part of it after making the loop on the up-stroke of the letter.

"There is another way of making capital S," said her mother. "It is very like printed S, and begins and ends with a dot. Tom will fetch a newspaper from the bookshelf, and we shall be able to see how curly both are."

S

"What a pretty letter !" exclaimed Nora, who liked the curves and the way the upper and lower parts were balanced. Tom hunted among the printed S's in the newspaper, and showed Nora how much they were like the printed S they were writing.

"It joins on badly, like the other one," said Nora.

Sink

"Now there are V, W, X, Y, and Z to write as capital letters," the children's mother said, as she gave them the words to copy which we shall find on the top of the next page.

"V and W are the only capital letters there that do not join," Nora remarked.

"It is possible to join them, but awkward," said her mother. "There are some words, like 'What,' in which

Very Walk Xmas

h joins fairly well, but when a vowel follows it, it is clearer to leave the letters unjoined. We must always remember, that directly letters are at all difficult to recognise, the writing is bad. So it is far better not to try to join on certain capital letters until you have thoroughly mastered the use of your pens. X, Y, and Z join on to any letter with ease.

Yeast Zero

"You have not yet learned to write the Roman numerals, so we will write them now. They are easy because they seem to be formed from capital letters.

"Some of these are the same as letters, though it is unlikely they really come to us from letters. V, for instance, is probably X halved. But it is easy to think of the Roman numerals as letters—one or I, two ones or two I's, three ones or three I's, one before five, five or V, one after five, two after five, three after five, one before ten, ten or X, one after ten, two after ten, and so on till twenty or two X's.

"The numbers between twenty and thirty, or XX and XXX (two tens and three tens), are made by adding the numerals from I to IX. Forty is XL, or ten before fifty, as L stands for fifty. Sixty is ten after fifty, or LX. Seventy is twenty after fifty, or LXX. Eighty is thirty after fifty, or LXXX. Ninety is ten before a hundred, or XC, for one hundred is C (short for Latin *centum*, meaning a hundred). So, you see, I or X before another number means take one or ten from it; after it, add one or ten to it. The Roman numerals take it for granted, that every girl and boy can do subtraction and addition."

I II III IV V VI VII VIII IX X
XI XII XIII XIV XV XVI XVII
XVIII XIX XX XXX XL L LX
LXX LXXX XC C

ARITHMETIC

HOW TO DIVIDE BIG NUMBERS

In our last lesson we learned how to divide the number 596 by 4. It is quite as simple to divide any other number, even though it be a large number, containing millions or hundreds of millions, by any number from 2 to 12. The multiplication table is all that is required, we shall find.

Divide 5279517 by 9.

9) 5279517
586613

Here there are 5 millions, but since that is less than the divisor, 9, it is clear, of course, that we shall not have millions in our answer. But we "carry" the 5, and placing it before the 2, we get 52 (hundred-thousands). Then say:

9 into 52, 5 and 7 over.
9 into 77, 8 and 5 over.
9 into 59, 6 and 5 over.
9 into 55, 6 and 1 over.
9 into 11, 1 and 2 over.
9 into 27, 3.

Divide 43848 by 12.

12) 43848
3654

Here, again, there are not enough ten-thousands to give any ten-thousands in the answer, so we have to carry the 4, and get 43 (thousands) before we can begin the division.

Say, 12 into 43, 3 and 7 over.
12 into 78, 6 and 6 over.
12 into 64, 5 and 4 over.
12 into 48, 4.

We have, of course, noticed by this time that the figure which we carry, the figure which is "over," can never be as big as our divisor. For, in learning what division was, we counted, let us suppose, the tens into each group until there were not enough tens left to make another for each group. That is, the number "over" was always less than the divisor.

When our divisor is greater than 12, the idea used in the division is the same as before, though the process is longer. For this reason, the method we have been learning is called *short* division; while the method for numbers greater than 12 is called *long* division.

Still, there are many numbers greater than 12 for which we can use short division. Suppose, for example, we have a number of things which we wish to arrange in groups which each contain 15 things. We know that there are 5 *threes* in 15. So, if we first arrange the things in groups of *three*, and then form larger groups by taking *five* of the groups of three, it is clear that each of the larger groups will contain five threes—that is, 15.

Divide 229695 by 15.

3) 229695
5) 76565
15313

As explained above, we first divide 229695 by 3. This shows us that 229695 things can be arranged in 76565 groups of three. We next divide 76565 by 5—that is, we form groups which each contain 5 of the groups of three, or 15 of the given things. The division gives us 15313 of these large groups, so that 229695 divided by 15 gives 15313.

In this way we are able to divide by any number which comes in our multiplication table. Thus, to divide by 108, we divide by 9, and then divide the result by 12; because 9 times 12 make 108, so that the first division forms groups of 9, and the second division forms groups which each contain 12 groups of 9, or 108.

In the above example, the two numbers 3 and 5, which when multiplied together make 15, are called *factors* of 15. Similarly 12 and 9 are factors of 108. The process just explained is, therefore, called *division by factors.*

It should be noticed that many numbers have more than one set of factors. Thus, 4 times 9 make 36, and 6 times 6 also make 36. To divide a number by 36 we may use whichever set of factors we like.

In our next lesson we shall learn long division, which has to be used in all cases where the divisor cannot be separated into factors.

EXAMPLES:

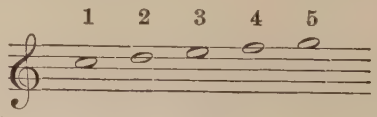
1. Divide 184429 by 7.
2. Divide 2043646 by 11.
3. Divide 816408 by 8.
4. Fifty-nine thousand and forty apples are to be packed in baskets. If each basket holds 72 apples, how many will be required?
5. How many times can 132 be taken away from 2997324?
6. A piece of ground contains 12096 strawberry-plants, in 96 rows. How many plants are there in each row?

MUSIC

THE RESTING GAME OF THE FAIRIES

THE fairies have something new to tell us; they say the white notes and the black notes may also be called *keys;* and when we talk of the entire number of black and white keys together, we are to call them the *keyboard.*

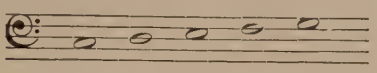
To-day we are to put our right hand on the keys. The fingers are just to rest on the key surface, but *we are not to press the notes down.* Our fingers must be curved, and just separated, so that each one may have a key to itself. We shall have five keys following one another in order, like this:



and we must remember that the fairies want the back of our hand to be quite level.

It is very easy to let the little-finger side of our hand slope downwards; but our fairy friends do not like this

at all; so we must watch very carefully. The first finger (we very often call it the thumb) must be quite free; we must not squeeze it against the hand, and the fingers 2—3—4—5 must rest in the middle of their notes. When we are quite sure that the right hand is properly placed, we must let the left hand take its turn, and play exactly the same game. The fingers must rest on the surface of five white keys:



5 4 3 2 1

but, just as before, *they are not to press the notes down.* Each finger must be separated from the other, so that each one may have a key to itself; the back of the hand must be quite level, the first finger quite free, while fingers 2—3—4—5 must occupy the middle of their notes.

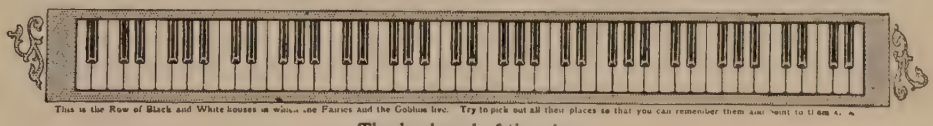
The fairies call this "the resting game," and they like each hand to play it in turn. Of course, while we are only thus resting on the surface of the keyboard, we cannot make the fairies sing; but it means that we are getting ready to make the lovely tone we so want to hear.

You and I want to make the piano sing, and that is why we are taking such trouble with our arms, our hands, and our fingers. We must think of our fingers, our hand, our forearm (that is the part of our arm near the hand), and our upper arm as four tools ready to do the different kinds of work we shall find necessary to make the fairies tell all their secrets. To-day we are learning how to rest, so that fingers and hands may be quite in their proper position, and quite loose—that is, free from any stiffness. The fairies give us one very safe, sure rule: *Whenever we feel stiff, we are wrong*, and it is a rule which we must always remember.

When we are quite sure our hands are resting in their proper position on the keys, we will again play the "fairies' see-saw game." We must keep our fingers just touching their notes, the hand being quite loose, and then, without depressing the key, balance the arm at the wrist, up and down, about an inch each way. This will show us if we are resting properly now our fingers are on the keys. You see, we have four games to play every day, and we must never forget one of them.

1. The sleepy arm.
2. Bending our fingers towards the palm of our hand, and then letting them spring back.
3. The fairies' see-saw.
4. The resting game and the see-saw together.

A man came into the world to show us how beautifully the piano fairies could sing. His name was Chopin. He played the piano exquisitely, and he tried to teach other people to do so, too.



The keyboard of the piano

Nothing made him more unhappy than to hear anyone *hit* the piano, or play at all roughly. He would say, "Is that a dog barking?" He was quite sure that the piano fairies could not make an unmusical sound unless they were approached wrongly, and treated badly. A pupil once told him that she had learned more from listening to singing than anything else. What do you think was his reply?

"That is right, all music ought to be song."

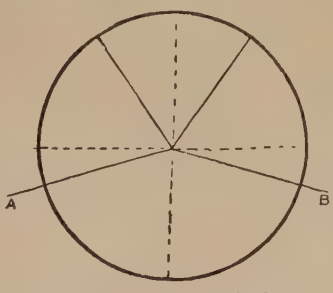
Frederick William Faber, who wrote some of our finest hymns, left us a beautiful idea when he sang about music:

There are sounds like flakes of snow falling,
In their silent and eddying rings;
We tremble, they touch so lightly,
Like feathers from angels' wings.

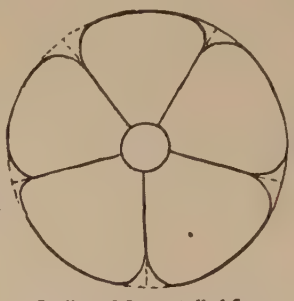
We must always remember that we move the notes or keys for one purpose only—*to obtain music.* If we want the fairy songs in all their beauty, we must call forth the lovely tone-pictures they paint for us, by *thinking, listening, and feeling.* We must think what the fairies want us to hear. We must listen for the *beginning* of every sound, to know we have found the right one. We must feel how much we have to do to set the keys moving.

MAKING CIRCLES AND FILLING THEM IN

EVERY boy and girl who learns drawing hears sooner or later the story of Giotto's famous O. In Italy the saying "Round as Giotto's O" has become a proverb. Giotto was a famous Italian artist, and when the Pope wanted a certain piece of work done, and sent a message to ask Giotto for some of his work that he might judge if he were clever enough to do it for him, Giotto took a piece of white paper, and with some red paint drew a circle so perfect that everyone marvelled, and the Pope needed no further proof of his skill.



1. How to divide a circle for five-petalled flower



2. Outline of five-petalled flower in a circle

3. The finished five-petalled flower

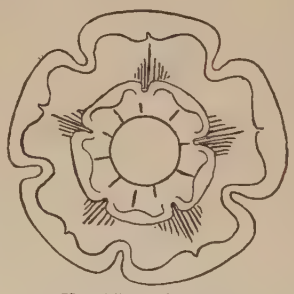
Circles are very, very difficult to draw, worse than straight lines, yet it is more natural for us to draw a curve than a straight line.

Our baby brothers and sisters always make scribbles in the shape of circles if we give them paper and pencil, and if we stand at the blackboard we shall find it easier to draw big sweeping curves than to draw lines.

To-day we will practise circles with white chalk on the blackboard or on sheets of brown paper pinned on the wall.

The first curve is the biggest one, drawn from the shoulder, standing at arm's length away from the board. The first half or two-thirds is easy; we draw outwards, not towards the chest at first; then we reverse and come back over the old line till the two ends join. The next curve is drawn from the elbow in the same way, but the circle is smaller, of course; and after practising these till we are satisfied, we will go to the drawing-board again and try these curves with charcoal on white paper, drawing from the elbow—that is, resting the elbow on the table and keeping it there while we draw—and then from the wrist, resting the arm on the table just between the wrist and elbow. The smallest circle is made by resting the hand firmly on the table, drawing from the wrist, and making the curves just as large as the fingers will let us.

When we have made good circles, which we can only do with plenty of practice, we will put in one of them the heraldic rose which came in our last lesson. It is difficult to put a five-petalled flower into a circle with freehand drawing, as all the petals must be the same size. The best way is shown in picture 1 on this page.



4. Heraldic, or Tudor rose

The two diameters—that is, the lines dividing the circles into quarters—are drawn as guides very faintly first; then the lines A and B just below the horizontal diameter. Now it is easy to draw in the petals as we see them in picture 2. The division between two petals always comes under the centre of one of the other petals, either the top or the bottom one.

There is a way by which we can divide circles exactly into parts, but this is done with compasses and to know how to do it we must learn geometrical drawing.

THE NEXT SCHOOL LESSONS ARE ON PAGE 3491.

WHERE DOES THE RAIN GO?

CONTINUED FROM 3385

MANY things happen to the rain that sinks in the earth, and exactly what happens depends largely on what the surface of the earth is like at that particular place. A great deal of the rain remains in the soil to the depth of some feet, as soil water or ground water. If there is no such water there can be no vegetable life. But in places where rain falls, and the ground holds some of it, there we are sure to find plants of various kinds, that suck up a good deal of this water into themselves by their roots, and then give it back to the air. The soil also contains all sorts of life of other kinds besides green plants, such as various kinds of animals, like worms and insects, and also countless numbers of microbes. All these take up and use for their lives some of the water that the rain gives to the soil.

But still a great deal of the rain is not used up in any of these ways. Much of it is sucked up again into the air by the sun's heat, when the rain stops falling. Much of it also goes on sinking slowly through the earth until it reaches a layer of something that it cannot sink through. It may be carried on this layer to some lower level, where it may bubble up out of the ground as what we call a spring. In the long run almost all the rain that is not kept by living things, or given back to the air at once, gets into streams and rivers, and into the sea, where the sun sucks it up to go on its round again.

WHERE DID ALL THE WATER IN THE OCEANS COME FROM?

We might at first think, if we remember how all the rivers run into the oceans, that rivers bring the water. But, after all, just as much water as the rivers bring is caught up by the sun into the air; and the amount of water in the sea is, in any case, too great for the rivers to account for. By far the greater part of the water in the oceans is what we may call the original water of the world, which has gathered in the ocean-beds because they are the most convenient places for it to be in, under the influence of the earth's gravitation. The water, as we know, was long ago held in the air when the air was much hotter than it is now. But, of course, it is right for us to ask where it came from even before it fell upon the earth and helped to form the oceans. The answer is that it was made ages ago by the burning of hydrogen with oxygen. Elements cannot combine with each other in intense heat, and so before the water of the world was formed it was

very hot, and hydrogen existed separately, though there was plenty of oxygen near it. As the earth cooled a little, however, it became possible for hydrogen and oxygen to combine, which they did, forming water. There is vastly more oxygen than hydrogen in the world, as we know, and most of the oxygen which was left over when the hydrogen was burnt up to form water is to be found in the atmosphere still.

HOW IS IT THAT THE WATER OF THE SEA DOES NOT SINK INTO THE GROUND?

Wherever it can, water does sink into the ground; and where the sea is deep, the pressure of all the water above will force the water at the bottom into the ground if it can possibly go there. It is probable that in most places the ground of the sea is of a very dense kind which water cannot penetrate as a rule; but often things may happen to it that will allow some water to pass through, and then, when that water reaches the hot levels of the earth's crust, it is turned into steam, and may make a great disturbance. We always think of earthquakes as things that happen on the dry land, but we know that earthquakes also occur in the bed of the sea. When a very powerful earthquake occurs in the bed of the sea, and a great deal of water sinks in and is turned into steam, we get what may be called a seaquake, and there is little doubt that some of the strange and terrible things which the sea does are caused in this way.

But we must suppose that, on the whole, the bed of the sea is not so easily penetrated by water as many parts of the dry land are, and that is perhaps one reason why it has become the bed of the sea. Instead of letting the water run through it, it holds the water upon the top of it, as the bottom of a basin does, and then the weight of the water gradually helps to force it down and make it cup-shaped, so that it will hold still more water. But we cannot be at all sure about this, for it is a very difficult thing indeed to find out.

WHAT IS IT LIKE AT THE BOTTOM OF THE SEA?

No man has ever been to the greatest depths of the sea, for even if it were possible to send air down to him, the pressure of water above his head would be far too great for him to stand. But we can get some idea of what it must be at the bottom of the deepest parts of the sea, for we know the kind of things that live there, and we know something of the conditions of their lives. Three, five, or eight miles below the level of the sea there cannot be very much light, and though it cannot be perfectly dark, yet it is what any of us would call quite dark. Here there lives a strange medley of creatures—strange fishes and sea-weeds. Down to them, from above, there descend the remains of all sorts of other sea creatures that live in the heights of water above them.

If we remember that the sea covers something like five-sevenths of the whole earth, we shall see that, of the total amount of life upon the earth, a very large proportion is to be found at the bottom of the sea. It is life of a very humble kind for at least two reasons. One is the immense pressure of the water above it, which prevents the development of more noble forms of life; the other reason, that has the same result, is the very small quantity of oxygen that is available for the purpose of life at the bottom of the sea. This means, of course, that the life of these creatures must be lived very slowly, and is indeed very different from the life of creatures that have air to breathe, or even a fish that lives in a stream which has plenty of oxygen dissolved in the water all around it.

WHY DOES A BOTTLE FULL OF HOT WATER KEEP HOT LONGER THAN ONE HALF FULL?

The answer to this is that the bottle full of hot water contains more heat than the bottle which is only half full. Water is a wonderful storehouse of heat. Different things require different amounts of heat to be put in them in order to be raised to the same temperature or hotness. We might think this should not be so, but it is. If you take a certain quantity of water at any fixed temperature you please, and then the same quantity of anything else in the world, and then make them both, say, five degrees hotter than they were before, you will find that you have to put more heat into the water than into the other thing; and just as it takes longer to heat water than to heat anything else, because you have to put more heat into it, so water takes longer to cool than anything else, because it has more

heat in it to lose ; and, of course, the greater the quantity of water, the more heat it has within it.

But there is another point to remember ; the bigger the mass of anything is, the longer it takes to cool. A thing cools from its surface inwards ; the parts inside it keep each other warm. The smaller the mass of a thing, the bigger is the proportion of its surface to the amount of stuff in it, and so the quicker it cools. So that the case of the hot-water bottles, the different rates at which the sun, the earth, and the moon get cool, and the fact that a baby requires to be more warmly clothed than a man, are all explained by the same law.

WHERE DOES THE OXYGEN IN THE SUN COME FROM IF THERE ARE NO PLANTS?

It is rather difficult for us to understand, but we must remember that a thing may be intensely hot and glowing and flaming without any burning, combustion, or combining with oxygen going on. The thread inside an ordinary electric lamp is an instance of this. Now, long ago, astronomers thought that the sun's heat and flames were due to burning going on in the sun, just as it goes on in a fire on the earth ; but then they came to ask themselves practically just the question we are asking : " If the sun's heat and light are due to combustion, where does all the oxygen come from, and where does all the fuel come from ? " If the sun were burning as a fire is burning, it would have burnt itself out millions of years ago. There is nothing like enough material in the sun to account for all the light and heat it produces. Therefore, burning, combustion, or combining with oxygen has nothing to do at all with producing the sun's heat and light, any more than with producing the heat and light of an electric lamp. The sun's supply of heat is kept up in other ways, partly by his ceaseless shrinking, and partly, we suppose, by the breaking up of the atoms of elements, such as radium, in the sun.

IF THE EARTH'S CENTRE IS A BALL OF FIRE, WHY DOES IT NOT BURN UP EVERYTHING?

When we say burn or consume, we mean combine with oxygen. So, if there is no oxygen in a place, burning cannot go on. The things there may glow, and be intensely hot, but they cannot burn—which is to combine with oxygen—for there is no oxygen at all for the things to combine with. That is one answer to our question, but here is another. Very nearly the whole of the outside of the solid earth is already as burnt as it can be, and so is all the water of the oceans. However hot we make them, and however much oxygen we have, we cannot burn water or sand or flint or clay or gravel, for these things are already burnt. When the elements of which they are made have combined with all the oxygen that they are capable of combining with, then they are as burnt as they possibly can be. Thus, the whole exterior of the earth, with only very scattered and slight exceptions, has already been burnt up, and what we call the earth and the sea are the results of that burning. This burnt crust now encloses the fire in the centre of the earth, and keeps out the oxygen of the air—the oxygen which has been left over, so to speak, from what has been used up in burning the crust of the earth.

WHY COULD NOT THE EARTH'S SHAPE BE ALWAYS UNDERSTOOD FROM AN ECLIPSE?

Of course, an eclipse of the sun by the moon would tell us nothing about the shape of the earth. So, to make our question quite correct, we should say not " an eclipse," but " an eclipse of the moon." Since this, as we know, is due to the earth's shadow creeping across the face of the moon because the earth is cutting off the sunlight by which the moon is lit, we are right and very thoughtful in supposing that the shape of the shadow ought to tell us the shape of the earth, just as our shadow tells our shape. And we find that the shadow is a convex one—that is to say, one curved outwards like the edge of a ball ; in other words, it is a shadow of a globe or sphere, and since we know that the earth throws the shadow, that tells us the shape of the earth.

But this most important argument, though it is interesting now, could not be used in the days when men were disputing about the shape of the earth. It can only be used when we know what an eclipse of the moon really is ; and we can only know what an eclipse of the moon really is when we have in our minds a picture of the solar system as it really is with the earth moving round the sun, and having the moon moving round

it as it goes. Though this all seems so plain and simple to us now, we must remember that we did not find it out, and that it took great labour and a very long time to find out. That is why those who argued long ago that the earth is round could not point to the shape of the shadow in an eclipse of the moon, and say that that proved their case. No one knew that that had anything at all to do with the matter.

WHAT WAS THERE IN PLACE OF THE EARTH BEFORE THE EARTH WAS FORMED?

Astronomers are not quite certain as to the details of the matter that existed in space before the earth was formed, and that gradually turned into the earth. This matter, indeed, probably passed through various stages rather different from each other. The simplest view, and one which is almost certainly true in the main, is that the last stage passed through before the earth was formed was that of a mighty cloud of glowing gas. It must have been very hot, for we have proof of that in the rocks, and in other ways; and as it was hot, it must have occupied a great deal of space. The earth upon which we live now is very small compared with that globe of gas, but, on the other hand, it is very much denser—for the earth has been steadily shrinking for countless ages, and we know that it is shrinking still. We may ask how it was that this great globe of gas came into being. We know that it did so by separating itself from the great mass of which the remaining central part is our sun. The other planets were formed in the same way, and so we find the same matter in the earth, and in the other planets, as we find in the sun. This globe was a little sun, indeed, as the great hot planet Jupiter is still; it was so hot that it must have given out light of its own.

WHAT HAPPENS TO THE LIGHT WHEN IT GOES OUT?

We have to think of light as a kind of energy, a kind of disturbance full of power that is made in the ether. It is a thing that travels at a tremendous speed, and it is not capable of being still. When we have a steady light in a room, it is not that there is something in the room called light which is staying there, but that from every millionth part of a second to every next millionth part of a second new light is being steadily made. So we cannot keep light in a room as we keep anything material. If, for instance, we take a heap of sand into a room and then, putting it in a heap on the floor, do no more, it stays there until something removes it; but light stays nowhere, it is always moving; and if there is to be steady light in any place, there must be a steady source of light to produce it from moment to moment, or it will cease.

When we darken a room we cut off the source of light, and the light which was made an instant before is gone. Now we see why. But this question is a most important one, and people often forget to ask it. Nothing is lost, and the energy or power that made the light is not lost, even though the room is quite dark. If we could trace it we should find that it had been transformed into other things; it is transformed into heat, which we find in all the matter which it strikes—and this includes not only the furniture and walls, but also the air of the room; it is also changed into the power which starts chemical changes, as, for instance, when carpets and curtains gradually fade under its influence.

DOES A FALLING STONE DROP QUICKER AS IT NEARS THE GROUND?

The answer is "Yes." If falling things did not fall quicker as they fell, it would hurt us no more to fall five hundred feet off a high cliff, or to fall thousands of feet from a balloon, than to fall to the ground when playing a game. The farther a thing falls, the more quickly is it moving when it reaches the ground, and the greater is the force with which it strikes the ground. If there were nothing to resist the fall of objects, there would be nothing to prevent this increase in speed getting greater and greater; but there is always the resistance of the air, and in the case of the fall of raindrops, that is sufficient to hold them back. If it were not for this, a raindrop falling on our head might fall with such terrible force as to kill us. The proper name for the increasing speed of a falling body is *acceleration*, and we shall remember not to spell it with two "l's" if we know that it comes from the Latin celer, *swift*. The acceleration due to the pull of the earth, which we call gravity, is the same for all falling bodies. It is

not greater for a heavier thing than for a lighter. Galileo showed this when he dropped two balls, one light and one heavy, from the leaning tower of Pisa, and they reached the earth at the same moment. The amount of this acceleration has been precisely measured. It is 32 feet in every second of time—that is to say, the falling body in each second falls 32 feet more than it did in the second before.

HOW FAR DOES A STONE FALL IN THE FIRST SECOND?

We know exactly the answer to this question. We might think at first, if we read the answer to the last question, that the stone must fall 32 feet. But 32 feet is the amount of increase in the rate of its falling at the end of a second, and at the beginning of the second the stone was not moving at all. Therefore, its average rate of movement throughout the second is midway between no movement at all and 32 feet—in other words, an average of 16 feet per second. That is what we find; at the end of a second the stone has fallen 16 feet.

WHY DOES A PLANT DO BETTER IN A POT THAT HAS A HOLE IN THE BOTTOM?

A plant, like every other living thing, must have water. A plant does not take in water by its leaves or stems, but only by its roots. When we water a plant from above, the water has to sink into the earth until it reaches the roots—and we may forget to water it! But if the pot has a hole in the bottom, and stands in a saucer filled with water, the water soaks through the hole just to where it is wanted—the part where the roots are. So it is carried up through the plant, and at last given off by the leaves. Plants must have water running through them, and so must we. In them it mostly runs upwards, and in us it mostly runs downwards. It is probable, also, that a plant would do a little better in a pot with a hole in the bottom than in one without a hole, even if it were not fed with water in this way, for at least the hole would provide for ventilation, and the plant needs a constant supply of fresh air as much as we do. Growing in the earth, it gets that, but in a pot made of something through which air can pass only very slowly, the plant's ventilation is rather interfered with.

WHY DO WE NOT GET ALL WE WANT?

Some people do get all they want, at least for most of their lives, though the time comes for almost everybody when he wants to get well, and cannot. Now, if we study what happens to these people who get everything they want, even without having to work for it, we find that it is very bad for them. It is quite certain that we, and every part of our bodies, and every power we have, are naturally meant to work, to fight against difficulties; and it is better to fight, even if we do not conquer, than it is not to fight at all. One of the reasons why history records so many wicked and degraded kings is, that these were people who, all their lives, got everything they wanted. Every living creature that gets everything it wants given to it without striving is apt to become weak and degraded.

Many sensible grown-up people who have lived careful lives, and have had a fair chance in the world, know that they do get all they *really* want. No doubt they would like to have more money than they have, or, if they are a higher kind of people, more wisdom than they have; yet they know that if they work they will get enough for their happiness, and if wise people have that, they do not worry themselves by wishing for more. Children do not know what they can get, and what they cannot get. So all children, more or less, cry for the moon, as we say, not knowing how far away the moon is. As they grow up, they learn that it is not worth while to worry about things they cannot have, but that it is much better to work hard for the things they can have.

WHAT IS IT MAKES US FEEL HUNGRY?

Most people confuse some very different kinds of things together, and call them all hunger, but that is a very bad and a very serious mistake. When a man has had a good dinner, and has perhaps eaten more than he should, and then eats a chocolate, or drinks a glass of liqueur, or takes a crystallised fruit, he is doing something which may, or may not, be quite harmless; he is taking something that he likes, but what prompts him is certainly not hunger. We eat and drink a great many things at meals, and between meals, just because they are pleasant to our senses of taste and smell. These senses

like to be pleased, just as our other senses do; but we no more satisfy hunger by taking a pleasant sweet because it has a nice taste and smell than we do by listening to singing.

Real hunger is quite a different thing, and the place where it really is caused is not either in the mouth or in the nose. A person who is really hungry will eat dry bread, or tasteless oatmeal porridge, without milk, cream, or sugar, and he will find it delicious. Real hunger is a state of the blood. The blood has used up much of its food material, and needs more. As it passes through the brain, the brain—which is where we feel everything—finds that the blood has not sufficient food materials in it, and it sets the body asking for more. That is true hunger, and if we ate only to live, we should eat only when we had this true hunger. If we eat too much, or without being hungry, we eat to die in the long run.

WHAT MAKES THE PUPIL OF OUR EYES GROW LARGER AND SMALLER?

If we think of a very small, but thick, india-rubber ring, we shall understand the answer to this question. The pupil is simply the hole inside this ring. The ring itself in our eyes is not made of india-rubber, but it is elastic. It is made of muscular fibres that run round the pupil, and enclose it. The name of this ring is the iris. In front of the iris and behind it there are layers of cells which contain colouring matter, and it is these that give our eyes their colour. When we look at anyone's eye we can see this coloured muscular ring and the black hole in the middle of it. When the little muscular fibres contract, the pupils grow very small. We can see this happen in anyone if we cover his eyes, and then suddenly throw a strong light upon them. We may see this, too, in a person who has taken too much opium, for opium makes the iris contract very strongly, and so a person under its influence has "pin-point" pupils. In the darkness the iris relaxes and stretches, and then the pupil gets very large. Foolish people sometimes drop belladonna into their eyes, since this drug poisons and paralyses the iris, and the pupils get very large and the eyes look brilliant. But the eyes suffer, for they cannot now protect themselves from a bright light by shutting off part of it. The use of this beautiful arrangement is to regulate the amount of light falling into the eye. If we go into a darkish room straight from the sunlight, we can see nothing. In a few moments things become visible. The reason is that our iris has relaxed, the pupils have become larger, and more light is entering the eye.

WHAT IS THE LOOFAH SOMETIMES USED IN THE BATH?

The loofah looks like a stiff, fibrous piece of netting, and because it is tough, not brittle, it makes a capital thing to use for a good brisk rub when we are bathing. But it is not made by hands. It is the fruit of a plant, and belongs to the same family as the cucumber. The cucumber is not fibrous, or we could not eat it, and the loofah, or luffa, differs from it in this respect. Of course, the loofah is not, in its natural state, like the loofah of the bath-room. The loofah that we use is simply the fibrous skeleton of the cucumber, or gourd, that grew in Egypt. After the fruit has ripened it is dried, and the fleshy part disappears, leaving only the fibres, and these are so strong, and stand the action of water so well, that a loofah lasts quite a long time. There are about ten species of loofah, and one sort, grown in the West Indies, is used as a sponge or dishcloth.

WHAT MAKES SHADOWS AND REFLECTIONS?

Both shadows and reflections depend, of course, upon light, but they are very different things. Everything we see, except the light of a candle, or the sun itself, or some other luminous body that gives out light of its own, is a reflection—that is to say, what we see is the light reflected from the surface of the thing. Now, a shadow may sometimes look like a reflection, and people sometimes mix up the two words, but there is a great difference. In the picture on page 3135, of some boys on a wherry, what we see is the reflection of them in the water. If the sun were behind the boys, then their bodies would interfere with the rays of light as they approached the water, and the water would show shadows which might be of just the same shape, or almost the same shape, as these reflections are. There is nothing difficult to understand about a shadow. Of course, the

whole of these shadows would be quite dark, unless there was some part of the boys that was transparent and let the light through. What we see in the picture are not shadows, because, for instance, the white tie of the fourth boy from the left is shown white in the water.

What has happened here is that the light, striking the front of the boys, and coming off from them in straight lines in all directions, has been reflected from the surface of the water, which must have been perfectly still like the surface of a mirror. There can have been no wind when this photograph was taken. In such a case water may

The sun is shining upon the front of these boys, and so we see their reflection in the water, as the white tie of one of the boys proves. If the sun were behind them it would be their shadows that we should see in the water.

be a very nearly perfect mirror. Yet it is not perfect, for some of the light passes through the water, and is there absorbed instead of being thrown back, or reflected, to our eyes. So, at all points, the reflection is less bright than the images of the boys themselves. If the water had thrown back perfectly all the light sent to it, there would not be this difference. Let us compare, for instance, the whiteness of the boy's tie and the reflection of it in the water.

WHAT WAKES UP THE BIRDS?

Sleep is a very mysterious thing that we do not know much about yet, but at any rate we are certainly mistaken when we think that sleeping creatures only wake up when something arouses them from outside. It is possible to study the exact amounts of noise that will wake people at different parts of the night, and we know that as morning approaches, healthy people or animals sleep less and less deeply, so that things wake them which would not have wakened them in the earlier part of the night. Healthy creatures probably either wake up quite apart from anything outside them, and because their brains have now rested long enough and are ready to start work again; or else their brains are just ready to wake up with the least thing, and some little noise or light—it does not need much then—gives the necessary signal.

So we may say, and it is perfectly true, that it is the light which wakes the birds, just as it is the dark that sends them to sleep. We know that during a total eclipse of the sun, when it gets dark in the daytime, the birds fold their wings and start to go to sleep. Of course, they very soon find out that they were wrong. But though the light of dawn, or perhaps the voices of other birds that have awakened a little sooner, seem to do the waking of the bird, yet we must understand that

waking and sleeping, in all living creatures that wake and sleep, really depend, not on what is happening outside, but on changes that go on steadily to and fro inside the creature in question, especially in its blood and brain.

ARE THERE ANY PEOPLE IN THE OTHER WORLDS?

This is a great question, to which no one can return a certain answer, and about which many big books have already been written and many more will be written. But something we can be sure of. People sometimes talk as if there could be *men* on other worlds, but we may be sure, when we think of the wonderful way in which men are adapted to this earth of ours, to its air, and water, and climates, and food supply, that there could be men like ourselves only on a world *just like ours*, and we certainly do not know of the existence of any such world. Those we know all differ greatly from our earth in all sorts of most important things, such as the composition of the air. *Man*, then, is a child of earth—this particular earth of ours; he is exquisitely fitted for it, and it for him, not only in its air, and soil, and oceans, and heat, but also in the kind, and the balance, as we may say, of the thousands of animals and plants that inhabit it with him. We are certain that men and women and children like ourselves could be found only here, or on some other world, unknown to us, which is an exact double of our earth. Such a world is quite unlikely to exist anywhere.

IS IT POSSIBLE THERE MAY BE LIVING CREATURES ON OTHER WORLDS?

This question is a very different one indeed from the last, and we need have no doubt at all that the answer is "Yes." To begin with, it would surely be very extraordinary, would it not, if *life*, which is the highest thing we know, and with which earth, and air, and sea are crammed, were confined, in this mighty universe, only to our little earth; if all the other worlds, big and little, far and near, were *dead*, and only rocks or glowing fires?

Then, again, we know that other worlds are made of similar materials to those that make our own earth, and we are sure that the laws of matter and chemistry apply everywhere, so that if life could be maintained on our earth, it might be maintained on many worlds. Further, we know that life has an endless power of fitting itself to outside conditions. Life flourishes on our own earth in extreme cold and great heat, on almost dry rock, and in the depths of the sea. So he would be a rash man who declared that life could not find, on other worlds, conditions fit for it to develop in. More than this, we have some hints—and more than hints—of real evidence that life exists on some other worlds, such as Mars.

ARE THERE MEN ON MARS?

The answer to this must certainly be "No," as astronomers have shown us that Mars is very different from the earth in many ways. It is smaller, so that the power of gravitation is less; it has very little water; its heat is probably very different—perhaps much hotter than the earth by day, and much colder at night; and it has not much of an atmosphere. For these, and a host of other reasons, any living beings on Mars must be vastly different from men in a number of ways. But, on the other hand, we can see on the surface of Mars markings which must almost certainly be due to strips of vegetable life, and it has just been proved that water exists on Mars, though this used to be denied. Also, we know Mars has an atmosphere, though one very different from ours.

CAN THERE BE ANY KIND OF INTELLIGENT LIFE ON MARS?

It is almost certain that there is life of some kind on Mars, and some people believe there are thinking beings on Mars—not men, yet beings who might understand men, and whom men might understand when they got to know each other's way of expressing themselves.

Some people who have given their whole lives to the study of Mars are quite certain that there are marks upon its surface which only intelligent beings could have made, and are even sure that all the "Martians" must be one great family who live in a friendly way, and have given up fighting each other as men still do, for the marks on Mars, it is thought, could only have been made by a race of beings who had given up wars, and frontiers, and quarrelling, and worked all together for the good of all. Perhaps the children who read this answer may live long enough to learn for certain what is the truth about the

"canals" of Mars, and how they came to be made. There is scarcely a more interesting question in the world.

WHAT IS THE USE OF THE PLANETS THAT HAVE NO LIFE ON THEM?

No doubt some of the planets have no life upon them, and no doubt life is the highest thing that can happen on a planet. But we have every reason to suppose that life will develop at some later date upon the planets, such as Jupiter, which are now too hot to bear it, just as our earth once was. So we might say that these planets are preparing for the "use" of bearing life. There may be other planets which are now too cold, but once had life upon them; and there may be planets which never had and never will have life upon them. We human beings may, perhaps, be able to make use of them by watching their movements in the sky, and that is all. But, though they are of no use, or little use, to us, perhaps they have a use and a meaning for their Maker.

WHAT IS THE USE OF STARS THAT ARE TOO FAR AWAY FOR US TO SEE?

People have tried the hopeless task of proving that even the stars which are too far away for us to see have some use for mankind—that perhaps they send us some kind of radiation which is useful for our eyes. There is no proof of this, and nothing is less likely. Probably the use of the stars which are too far away for us to see, and the use of the stars which are not too far away for us to see, are the same as the use of the star which we can see best, and which we call the sun—to support and nourish life in their neighbourhood. And if there are stars which have no such use, and which certainly might not exist for all the difference they make to us, yet there are more uses and purposes in the universe than we can guess or dream of.

WHY DO WE WANT TO WALK SLOWER UPHILL THAN DOWN?

When we walk on the level we have only to work against such things as the resistance of the air, and the weight of our legs as we lift them up and down. When we walk downhill, less effort is required on our part in some ways because, in walking downhill, we are to a certain extent falling—that is to say, we are being pulled nearer the centre of the earth. Yet in course of time, especially if a hill is very steep, it may be very fatiguing to walk down it, because we have to balance ourselves so carefully. This is owing to the strain on our toes pressing against the inside of our boots, and the half-conscious fear in our brain that we may be pulled down too quickly and hurt ourselves. When we walk uphill the work is very hard, because then we have, by sheer muscular effort, to lift our whole bodies away from the centre of the earth in defiance of gravitation. We have to exert in the opposite direction a greater force than that of gravitation.

DO WE USE UP MORE ENERGY IN WALKING UPHILL THAN ON THE LEVEL?

The difference can be measured in such cases, and it is said that to walk up a steep hill at a given pace costs us more than twenty times as much effort as to walk at the same pace along the level. No wonder, then, that we want to walk slower uphill! The reason is really exactly the same as the reason why we lift a heavy weight in our hand more slowly than we let it down. In one case we are pulling against gravitation, and exerting a greater force than gravitation; in the other case we are only exerting a comparatively little force against gravitation so that the weight shall not fall down to the ground too quickly.

This difference—whether we walk against gravitation or with it—shows in another way. It is not much use for a stout man who wishes to get thinner to walk on the level. Let him walk uphill, and he will soon find that he requires to burn away a lot of his fat to provide the power that will lift his body against the earth's pull.

WHY ARE WE GIDDY WHEN LOOKING DOWN FROM A GREAT HEIGHT?

Everyone does not become giddy when looking down, and anyone who is in good health can learn in time by practice how to look down from a height without turning giddy. There are two explanations of this giddiness. One is the general explanation that the fear of falling disturbs the working of the brain. Now, our sense of being balanced, and our feeling that we are able to balance ourselves, depend upon the proper working of the brain; and so the fear of falling may make us giddy, just as giddiness may be caused at times by other kinds of fear.

But people who are not in the least afraid, or who did not at all expect to be afraid, may turn giddy when

they look down from a height, and there is a very interesting explanation of this. Part of our power of balancing ourselves depends upon vision. We know how one is apt to bump against a companion when walking at night, for instance. And even though we can balance ourselves without the aid of sight, yet we are very apt to feel giddy if our eyes play us any tricks, and that is what they do sometimes at a height.

WHY, WHEN WE LOOK FROM A GREAT HEIGHT, DO THINGS SEEM BLURRED?

As a rule, anything we look down to see is quite close to our eyes—a few inches when we are reading, for instance, or a few feet when we look at the ground; and it is the rule that when we look at anything near, our two eyes turn inwards towards each other slightly, or converge, as we say. The eyes are so accustomed to converging when they look downwards—as the things they look down on are usually near, and as the two eyes cannot see a near thing well unless they converge slightly in looking at it—that they do the same when we are on a height, and perhaps the nearest thing is the ground, hundreds of feet below us.

In order to see a thing so far away, our eyes should look straight out, parallel with each other. But until we have learnt to go on high places, the eyes converge, and so are bound to give us a blurred view of the ground. Then we feel that we cannot see properly and become frightened and giddy This is what students of the eyes believe, but we ought really to make experiments with people who hold the hand over one eye when they go on high places, and to see whether they feel more comfortable when they do so.

HOW CAN PLANTS GROW ON A BARE WALL?

One of the most important parts of the food of green plants is found, as we know, in the air. That is the carbonic acid gas, which provides the plant with its carbon. But that, of course, is not all. The plant must have water, and it must have salts. Now, a bare wall is not as bare as we think it, when we come to examine it closely. In the first place, rain falls upon it, and so the plant gets its water. Nor is this all. Rain itself contains minute quantities of salts which are valuable to the plant; and as it trickles down the wall, it gains more. It has the power of melting, out of the wall, salts that may be contained, for instance, in the mortar. We know that lime is very valuable for plants, and mortar is really a kind of lime. So we find on examination that plants can obtain, even growing on a bare wall, those things that are necessary for their life. But, of course, the supplies of certain essentials are very scanty, and the forms of plant life which can grow in this fashion are very humble, and never reach a large size. Very different is the case of the plant that grows over the bare wall, but has its roots in the earth, from which it draws nourishment.

WHY DOES THE BOOMERANG COME BACK?

Some people suppose that the boomerang comes back after hitting what it is aimed at. That would really be very convenient indeed when the instrument is used in the chase, but it does not happen. The first part of the boomerang's path is straight, or practically straight. It is expected to hit its object while it is in this part of its path. If the boomerang were flying through nothing, it would have to fly *always* in a straight line, according to Newton's great law of motion.

But the boomerang is flying through air, and it is so shaped that the air resists one part of it more than another, so that it has to travel in a curved path after its speed has slowed down below a certain rate. As it travels in a curve, it *more or less* comes back to the place it started from. Endless study has been devoted to finding why the boomerang must be its exact shape, what are the consequences if its shape is a little different, what is the speed at which it begins to curve, how its weight and size affect the curve, and what is the relation between the curves of the boomerang itself and the size of the curve it makes in the air. But these questions are immensely difficult, and still undecided. If the boomerang, instead of being *gradually* slowed down, is arrested entirely in its flight, as when it hits something, it simply drops "dead," as we might say. Perhaps the most wonderful thing about the boomerang is the fact that it has been brought to perfection among the natives of Australia, who are almost the lowest race of mankind.

The next Questions are on page 3539.

A SECOND TALK ABOUT TREES

WHAT TREES HAVE DONE FOR ENGLAND

CONTINUED FROM 3406

WHEN we enter a great building like Westminster Abbey, we are so surrounded by the magnificence of masonry that we are apt to forget the wooden doors which let us in. Those wooden doors close at night; the lock is turned; they guard the abbey; they shut out the world; the mighty dead rest safely in their graves because of them. The forest guards the rock.

How the brain works, looking at those old carved and nail-studded doors, and thinking of the day when they grew in some English forest, their roots hidden underground, their branches swaying in the wind, their leaves making a pleasant rustle in the summer air! Birds built their nests in them long before the Wars of the Roses. The woodpecker tapped at their bark long before Shakespeare walked from Stratford across the fields to Shottery St. Mary. Squirrels ran along their boughs while the Normans marched through the land. They will be hanging there when you and I, and our children's children, have passed away for ever from this earth!

Those old doors of the abbey! Does the sacristan ever think, as he turns the great key in the lock, of the many men who have fastened those doors before him, and who are now dust of the earth? Does he ever realise that he is handling the woodland of the Angles? Does he sometimes think that he hears the sap rising, that he feels the chequered shade of leaves on his face, that he sees birds building their nests in the branches? Not he. This good man has but one business with those doors—to turn the key. If he does that faithfully and well, none will find fault with him.

Someone has nobly said that it is good to look upon oaks that are kin to those immortal trees that died to live for ever as the Victory and the fighting Téméraire. Have we ever thought of that? The woodman's axe rang in the English forests. The carter came with his team of willing horses.

A sound like tearing thunder rent the air. Down fell a king of the forest. Dead? No; immortal. The carter called to his horses; they slipped and stumbled and strained in the traces; the wheels turned; the whip cracked; off went the forest king to become the Nemesis of a tyrant, the ruin of an enemy, the glory of England.

Let us read these great words:

May the Great God, whom I worship, grant to my country, and for the benefit of Europe in general, a great and glorious victory; and may no misconduct in anyone tarnish it; and may humanity after victory be the predominant feature in the British fleet! For myself individually, I commit my life to Him that made me, and may His blessing alight on my endeavours for serving my country faithfully! To Him I resign myself and the just cause which is intrusted to me to defend. Amen. Amen. Amen.

They were written on the morning of October 21, 1805, in sight of the fleets of France and Spain, in a bay called Trafalgar. They were written by Nelson. At sea? Yes; and yet in a forest.

THE OAKS FROM ENGLISH FIELDS THAT CARRIED NELSON AT TRAFALGAR

Oaks from English fields, under which children had played for many a generation, and at whose spreading base primroses grew all wet with April rains, formed the walls of that house in which Nelson sat writing. Were they ever more beautiful in the forest than on that immortal morning when, with crowding sail, they swept towards Napoleon's challenge, and Nelson stood there in his admiral's frock-coat with the four stars of honour on his left breast, the empty sleeve pinned near them, asking Captain Blackwood if another signal were not needed?

Captain Blackwood made answer that he thought the whole fleet seemed very clearly to understand what they were about. These words were scarcely spoken before that signal was made which will be remembered as long as the language of England shall endure—Nelson's last signal: "England expects every man to do his duty!"

Oaks of England bore him in their arms when in a divine moment of inspiration he made himself England, and spoke for England to her sailors. Can we not hear the voice of English oaks in those words?

THE TREES OF THE ENGLISH FOREST THAT LIVE FOR EVER

Dead trees? The beautiful lichen and the glorious bark stripped off; trees no longer, but daubed with paint, black and white, hammered with nails, fastened with iron, a ship, a fighting ship of England! No, not dead trees; immortal trees; the oaks of England, the forests torn up from the soil of England and hurled at her enemies, woods in movement like the trees in the prophecy to Macbeth; yes, still trees, and trees that will live for ever. Let us read the story of that tremendous day, and ever after when we see an oak in an English forest we shall read there the name of Victory. We must remember, too, that the Dreadnoughts speed through the sea on the black wings of dead trees, which we call coal.

One likes to think, too, of the blind Milton groping his way with a stick cut from an English forest. He saw in his darkness a beam of light, which was Freedom, and he fumbled his way to it, tapping the invisible ground with his stick. Drake fought for England, Nelson fought for England, and Milton fought, too. He was one of the greatest minds that ever realised the full dignity of man, and ever hated those who would bind the human race in chains. He fought to get freedom. Is it not one of the greatest pictures in England's gallery of heroes, that of the blind Milton groping his way with a stick? One likes to think it was cut from an oak which gave Nelson his Victory and his Téméraire.

WHAT MILTON WROTE OF ENGLAND ON A TABLE OF ENGLISH OAK

It was on a table of English oak that this great Milton wrote of England: "Why else was this nation chosen before any other, that out of her, as out of Sion, should be proclaimed and sounded forth the first tidings and trumpet of Reformation to all Europe?" And from that day forward the march has been continued throughout all fields of her national life. Across the historic table of English oak in the House of Commons has been waged the war of Reformation, the war between tyranny and freedom, between truth and falsehood, between God and Mammon.

The architect learned from the forest to build his stately aisles and arch them in with graceful roof of stone. No building of grandeur but has its roots in the forest. Man has gone there to learn how to build. He has gone there for his spears, his bows, his ships. England's long history is inseparably and for ever bound up with the forest.

FOR OTHER TALKS ABOUT TREES SEE INDEX, AND FOR THE NEXT FAMILIAR THINGS SEE PAGE 3519

THE NATIONAL TREE OF BONNIE SCOTLAND

The slender leaves of the Scots pine remain on the tree for two years before they fall. In the first year they are a light bluish green in colour, which gradually changes to dark green. The fallen leaves kill other plants.

Scots pine grows in English pine woods. Its pollen, or seed, is found upon the ground in large quantities near pine woods, and looks like sulphur. When, in 1902, people found the pollen lying very thick on the ground, they wrote to the newspapers to say that sulphur from the volcanic eruption at St. Vincent had fallen in England.

THE HOLLY WITH THE PRICKLY LEAVES

The white flowers of holly are very small, but, like the red berries that come later, they are very conspicuous because they grow together in such great numbers.

Cattle like young holly leaves, and on the lower branches the spines are developed for protection. At the top of the tree, out of reach of animals, the leaves have no spine.

We know holly best as a bush, but it grows to a tree, forty or fifty feet high, and when covered with the rich, red berries is a magnificent sight. Evelyn, the well-known writer, calls it "a glorious, refreshing object."

THE WILD CHERRY OF THE COUNTRY-SIDE

The leaves of the wild cherry-tree are a deep blue-green in colour, and grow on slender branches. When the tree is in bloom, it is covered with a mass of delicate cup-shaped flowers, that later produce myriads of cherries.

This is a fine specimen of the wild cherry-tree, for usually it grows like a mere bush. The luscious Kentish cherries of the orchards are descended from the wild cherry, which was planted all over Kent in the 16th century.

THE WILD PEAR-TREE OF THE WOODS

The leaves of the wild pear are, in shape, very much like those of the wild apple, and their under-surface is downy.

The white flowers are clustered in groups of five, and the fruit that comes from them is rough and uneatable.

The wild pear-tree, which is the origin of all the luscious kinds of pears that we see in shops, is not found farther north than Yorkshire, but where it grows it lives long. Stained with black, the wood is almost exactly like ebony.

THE WILD APPLE-TREE'S DAINTY BLOSSOM

The leaves of the wild apple-tree vary very much in shape, as may be seen here. They are smooth on the upper surface, but sometimes very downy underneath.

Few flowers that grow on trees present a more beautiful sight than the clusters of wild apple blossoms, with their white petals delicately tinted with pink.

We all know the crab-apple tree, which is so beautiful in spring when it is covered with a mass of fragrant blossoms. In some parts of the country cider is made from crab-apples, and crab-jelly is a favourite country delicacy. Most of the mistletoe that grows in England is found on the twisted trunk of the wild apple-tree.

THE WHITE-BEAM WITH THE RED BERRIES

The leaves of the white-beam are coarsely toothed at the edges, and the under-surface is covered with white down.

The white-beam's loose clusters of white flowers produce scarlet berries, called in the North chess-apples.

The white-beam is one of the less-known trees, but it is very useful, as the English use its hard wood for making cog-wheels in machinery where iron is not suitable. Birds and squirrels are very fond of the scarlet berries.

THE WILD SERVICE-TREE OF THE HEDGE

The flowers of the white-beam on page 3446 are remarkably like those of the wild service-tree; in fact, the one blossom is often mistaken for the other. The leaves of the two trees, however, are quite different.

The wild service-tree is very common in the south of Britain, and is often to be seen in the neighbourhood of London. But, though ornamental, it does not often grow very high. The greenish-brown berries are sometimes sold in fruiterers' shops, for, though rough and acid when fresh, they are pleasing when mellowed by frost.

THE ASH-TREE THAT WAS USED FOR LUCK

The leaf of the mountain ash is like that of the ash, and thus it received its name, but really it has no relationship to the ash. This tree was once thought to bring luck.

The delicate white flowers, with their fragrant smell, are like the hawthorn, only smaller, but we can see how different they are from the true ash on page 3186

The mountain ash will grow almost anywhere in the poorest soil, and it is very common in London gardens. In olden days country people used to make ale from the scarlet berries. Its other name of rowan means "charm."

THE HAWTHORN'S FRAGRANT BLOSSOM

Hawthorn rarely grows larger than a bush in places where cattle have free access, because the animals are very fond of eating the leaves and young shoots.

The hawthorn flower is the fragrant blossom that the English call the "may." It is usually white, though sometimes it will be found tinged with pink.

Although cattle are so fond of hawthorn, it makes good fencing for fields, if protected from the animals till it has grown to a large bush, for the branches then get very dense and the spines protect it. Otherwise, the cattle would eat the hedge and escape from the field. Hawthorn is called whitethorn because of its light bark.

THE BLACKTHORN THAT GIVES US SLOES

The white blossoms of the blackthorn produce the sloe berries that are used for adulterating cheap wines. Fifty years ago, when tea was dear, country people made tea from blackthorn leaves.

Blackthorn is not called by this name because its flowers are darker than those of the whitethorn, or hawthorn, for they are really whiter but because the bark is nearly black. Blackthorn is used all over Cornwall for hedges.

THE ELDER, THE TREE OF THE WAYSIDE

The elder leaf is divided into five, seven, or nine oval leaflets. Here we see, not twenty leaves, but only four.

The cream-coloured flowers of the elder grow in clusters of five, and when dried they have a very pleasing odour.

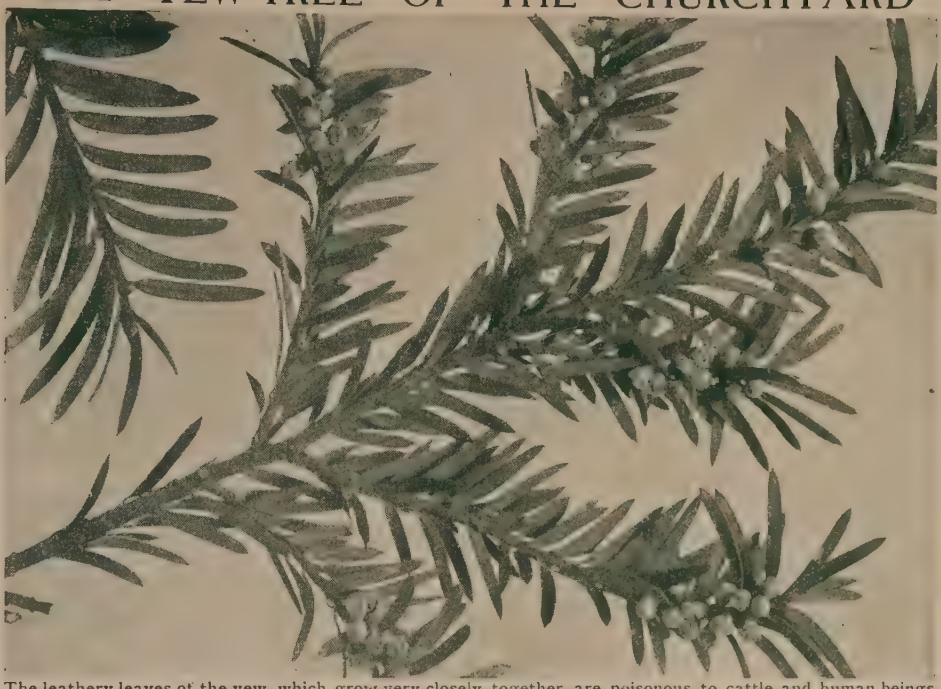
The elder is the tree of the wayside, and though on good, moist soil it grows twenty feet high, it is rather a bush than a tree. Country people make wine from the berries, and medicine from the flowers. Evelyn, the writer, calls the elder "a cure for all ills." Boys like the elder because the branches make fine pea-shooters.

THE PLANE-TREE OF CITY AND TOWN

The broad leaves of the plane give the tree its name, for "plane" means "broad." The leaves are like those of the sycamore, but the two trees are not related. The flowers grow in little round balls like old-fashioned buttons.

The plane is the most long-suffering of trees, for no amount of smoke and dirt seems to affect it. Even when the bark and leaves are covered with soot, the tree still flourishes, and this is why it is nearly always used for lining English streets. All sorts of other trees have been tried for this purpose, but none flourishes like the plane.

THE YEW-TREE OF THE CHURCHYARD



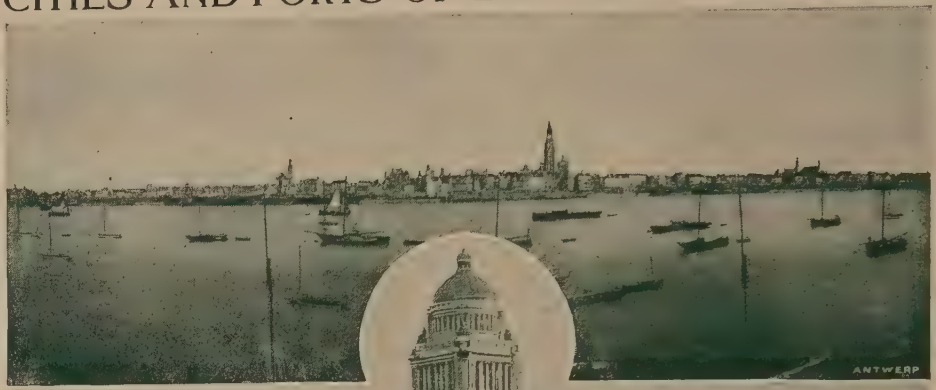
The leathery leaves of the yew, which grow very closely together, are poisonous to cattle and human beings, although the berries are not harmful. Often when a yew hedge has been cut, and the leaves thrown aside, cattle have been found dead, having eaten the leaves. This picture shows the leaves and the small male flowers.

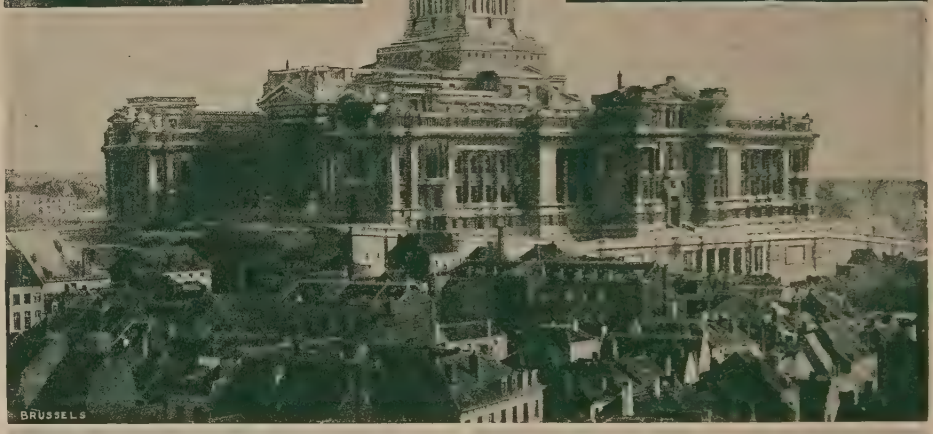
The yew is the longest lived of all the British trees. One at Fortingal, in Perthshire, is nearly 2,000 years old. Before firearms were invented, yews were grown by royal command, because the tough, strong wood was needed for making the long-bows which English archers wielded with such skill. Every churchyard in the country used to have its yew-trees, and many still remain. "A post of yew will outlast a post of iron" is a common saying.

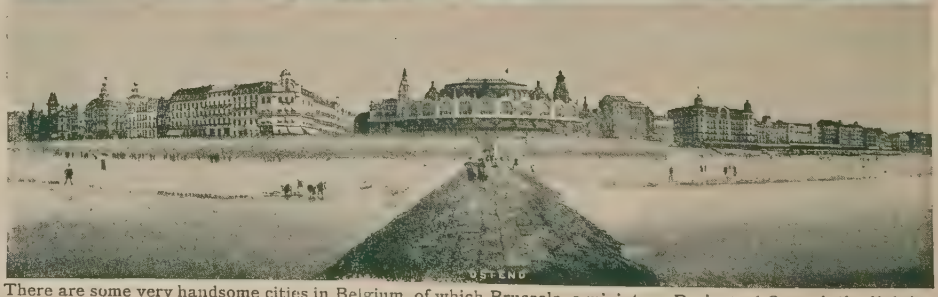
The photographs on these pages are by Henry Irving

THE NEXT PICTURES OF FAMILIAR THINGS BEGIN ON PAGE 3519

CITIES AND PORTS OF BELGIUM & HOLLAND







There are some very handsome cities in Belgium, of which Brussels, a miniature Paris, and Ostend, the Belgian Brighton, easily take front rank. The Palais de Justice, or law courts, at Brussels, is one of the finest modern buildings in Europe, as may be seen from the picture of it on this page. Antwerp is one of the half-dozen greatest commercial ports in the world, and has an annual trade of a hundred mill on pounds. The great commercial ports of Holland, Amsterdam and Rotterdam, too, are among the most important seaports of the continent.

In Holland the waterways cut up the land in all directions, and the landscape is everywhere dotted with windmills, that are largely used for the purpose of pumping and draining the land.

HOLLAND AND BELGIUM

CONTINUED FROM 3362

THE highest land in Europe, and the lowest, are linked together by the River Rhine. Far away amid the mountains of Switzerland it starts on its long journey, leaping like a merry child, till it passes into the quiet waters of Lake Constance. Then, with growing strength, it dashes and roars, as it tumbles over the rocks at Schaffhausen, and then flows, in staid middle life, rapidly and steadily north, useful and strong and beautiful, for many, many miles through Germany. After passing the grand gate of the Seven Mountains near Cologne, it goes slower, as if age had come upon it, and at last, stretching out weary arms, it seems to be blindly searching for the sea, in which to end its course in peace.

The triangle of low land on the shores of the North Sea between France and Germany—lying in the grasp of these arms of the Rhine and about the lower courses of the Meuse and the Schelde where the great north plain of Europe is narrowest—has been known through history as the Low Countries, or the Netherlands, nether meaning lower. Small as the district is—not so large as Scotland—it has fallen into two distinct countries, occasionally united under one rule through the centuries. Holland, the hollow or marshy land, the northern and larger half, with its ragged coast, lies chiefly in the Rhine delta. Belgium, to the south, has but fifty miles of coast, and consists of the lowlands drained by the Meuse and Schelde, and the highlands of the Ardennes, wooded hills as high as the Berkshires.

It is a very favourite holiday trip now to go to the Ardennes from England. A quick passage of three and a half hours takes us from Dover to Ostend, and from there we can either make a tour round the splendid old cities, speaking vividly of the past, and closely dotted over the fertile and busy plain with its wide swelling rivers, or we can pass on to the beautiful walks and cycle rides, the fine views and interesting caves, the cool woods and bright streams, of the hills beyond on the south-east.

If we prefer a longer sea voyage we can enter Belgium by the estuary of the Schelde to Antwerp, a very great port, connected by rail and canal with not only the rest of Belgium, but with the industrial towns of the Lower Rhine, about a hundred miles away, and easy of access to the places across the ocean which send Europe the raw material that it cannot grow itself. Bruges and Ghent, also deeply interesting old cities, are connected with Antwerp by canals, and Brussels, the capital, is in the centre of the kingdom,

so gay, and full of fine shops and handsome buildings, that it is sometimes called a miniature Paris.

It is an easy journey to pass from Brussels to Holland, but if we go direct from England to its shores, we can land either at Flushing, on an island on the north bank of the Schelde, or at the Hook of Holland, on the north side of the Meuse, which leads to Rotterdam, the great port of Holland. The channel of the Meuse is the chief entrance to the Rhine.

THE DUTCHMAN'S BATTLE WITH THE SEA THAT HAS LASTED A THOUSAND YEARS

Between Flushing and the Hook are the numerous muddy islands formed by the sediments brought down by the great rivers, so here we have some of the earth of Switzerland, Germany, and France. North of Rotterdam are the Hague, the beautiful capital of Holland, Utrecht, Leyden, and Haarlem, so famous in history, and Amsterdam, Holland's largest city of commerce, on an arm of the Zuyder Zee. The Zuyder Zee is the youngest sea in the world, for it was formed only about 600 years ago, when the water burst in over the land, sweeping away villages and farms and the poor folk who lived in them. The greater part of Holland is below the level of the North Sea.

There is an old Dutch proverb: "God made the sea, but we make the shore." For more than a thousand years the making of that shore has been the first duty and thought for those who, living in the land, wished to protect it, and enlarge its borders, against the storms and tides that dash against it.

As we travel through Holland to-day, we are astonished at the engineering skill that has grown through the centuries from perpetual battle with the water.

A LAND WHERE THE FISH SWIM ABOVE AND THE BIRDS FLY BELOW

Let us stand on one of the great dykes, or sea walls. It is perhaps sixty feet high, and broad enough at the top for a carriage road, bordered with trees and buildings. The sea laps quietly, though it may rage and roar to-morrow, not far below the level of this road, and boats come alongside to little piers and quays; but the other side slopes deep down to the green meadows, so that we on the dyke can see down the chimneys of the houses nestling on them below, and the fish on the one side are higher than the birds on the trees on the other. Very strong, built of stones and cement and willow boughs, are these walls which push back the ocean, and constant care is needed to see that there is no leak, and that the various gates and sluices are in perfect order.

There are strong walls, too, round the lakes and on the banks of the rivers that become flooded when the snow melts in the distant Alps; and everywhere are canals and ditches cut to regulate the flow, and to help the land to keep its head above water. In many places, continuous pumping has to be carried on, and this is largely done by the windmills that are such a feature of the country. From the top of the dyke we can perhaps count twenty or more, for the Dutch make the most of the labour of that riotous giant, the wind, who often does so much mischief in the country.

Besides pumping and draining, the windmills saw up wood and grind corn. Many lakes are formed by the draining of the marshes, which has been done with enormous toil and skill; and as we pass from the Hague to Haarlem in the train, we see one of the largest *polders*, as the drained marshes are called, beautifully green and fertile.

A CITY BUILT ON ISLANDS, WITH CANALS IN THE STREETS AND 300 BRIDGES

If our visit is in the early summer, the reclaimed land will be brilliant with the lovely bulb flowers for which Holland is so famous. In most of the towns, canals run through the streets. Amsterdam, for instance, is built on almost as many islands as Venice, and the canals are crossed by 300 bridges. The soil is so moist that, generally, houses have to be built on a foundation previously made firm by driving in a number of piles. Erasmus, the great Greek scholar, who lived at Rotterdam, and did so much to prepare the Reformation, had this in his mind when he said that he knew a city in which people lived like crows on the tops of trees.

Holland is so flat that there is but one danger-board for cyclists in the whole country. If we mount the towers of any of the fine old cathedral churches we can see all round for miles, right away to the distant horizon. And a bright and wonderful view it is on a sunny day—quite dazzling, for the

water shines everywhere, and so do the brass weathercocks and the steel railway lines; and even the sails of the boats on the canals gleam against the green of the fields. It is so strange to see sails mixed up with trees, especially when the rivers or canals are higher than the fields. And over all is the tenderest, delicate light, which Dutch artists know so well how to paint in their pictures.

If our visit to Holland is in the winter, a very different scene meets our eye. Instead of the vivid green, a mantle of white rests over all, and the gleaming waters of the canals and ditches are frozen hard and are covered with skaters—doctors going to their patients, children to school, labourers to their work. The Dutch and the Fen-men are among the best skaters in the world and the Fen counties of England are very like Holland. We have seen many beautiful pictures by great Dutch artists, such as Rembrandt, Rubens, Franz Hals, in the great art galleries, but in the cities of the Netherlands there are ten times as many, illustrating, with the relics in the museums, the life and history of the country, the great scenes which took place through the centuries, the portraits of the leading men who made or marred its happiness, as well as the pictures of home life in palaces and cottages in days long since passed away.

A SNAPSHOT IN A STREET OF HOLLAND

Although the people of Holland are industrious, no matter where we go, we can see the men standing about, dressed in their big, balloon-like breeches, smoking or talking.

Let us now, for a while, leave the busy and populous Belgium of to-day, and the Holland so carefully wrested and guarded from the ocean, and glance at the story extending over 2,000 years, of the struggles by which the Netherlands have not only in the end kept their small corner of Europe independent, but which have so strengthened and educated the people that, for centuries, they have been the world's teachers in most of the matters that are worth knowing.

The Low Countries formed but a dull, damp district, shut in by the gloomy depths of boundless forests when we first catch sight of them in the searchlight thrown by Roman civilisation. For countless ages the rivers, which, we see, are very numerous all over the land, had been steadily bringing down slime and mud, and the wind and tide had been occasionally dispersing and destroying the banks thus formed. The early Keltic people who chose these shifting swamps for their home lived like beavers among the tangled brushwood on the islands at the mouth of the Rhine. The bravest of them were the Belgæ, who have left their name in Belgium, and, when the Romans came, several German tribes, of much the same stock as our own forefathers, had pushed out the Kelts. Amongst them the Batavians and the Frisians were celebrated for bravery and love of freedom and their determination to protect the land on which they dwelt. The Batavians proved of great use in the Roman armies.

In the fourth century, the Frankish tribes came swarming over the Rhine, and by degrees they absorbed the Frisians and the Batavians and the rest of the tribes living in the morasses and low plains, till at length all the

country fell under the rule of the great Charlemagne. He left the people their native customs, and put chiefs over them as his delegates, whom they had to obey. Part of Charlemagne's plan was to give wealth and power to the bishops of the newly Christianised tribes, and for nearly a thousand years these prince-bishops were very important. After Charlemagne's death the great empire broke up, and under the weak rulers that followed, the independent nobles became ever stronger. There were the Bishops of Utrecht, where was the first Christian Church, the Counts of Holland—Holland being originally a province, which later gave its name to the country.

The Dukes of Brabant and the Earls of Flanders—William of Normandy took his bride from Flanders—were very important nobles as well as the lords of Hainault, which also furnished an English queen, of whom we read elsewhere. Other small states were Guelderland and Friesland. The old laws of the Frisians declare that the race shall be free, as long as the wind blows out of the clouds and the world stands, and this principle has always been kept in view even in times of overwhelming trouble.

THE RISE TO WEALTH AND POWER OF THE CITIES OF THE NETHERLANDS

These were the bad old feudal days, when the nobles were for ever quarrelling amongst themselves, and, according to their opportunities, doing their best to take away the liberties of the people. The prince-bishops gained more and more power over men's minds, till no one dared to think for himself.

We know how the rise of important towns has always helped on the cause of freedom, and though the towns in the Netherlands are not quite so old as some in France, Italy, and Germany, most of them date from early times. When trade was set moving by the impulse of the Crusades, the towns of the great north and south route began to rise from small beginnings to wealth and power. In the thirteenth to the fifteenth century, the towns of the Netherlands did much business with the towns of the famous Hanseatic League, of which we read on page 2526. In the fourteenth century there were over 3,000 woollen manufactures around Malines, now the centre of the Belgian railway lines; Ghent had 40,000 weavers, and the golgsmiths of Bruges were numerous enoudh to form a regiment by themselves in time of war. The towns of Delft, Haarlem, Rotterdam, Amsterdam, were all growing, though often devastated by the endless quarrels of landowners and townsmen.

HOW ENGLAND GREW WOOL FOR THE FLEMISH LOOMS

It was at this time that England grew so much wool for Flemish looms. Linen, too, of various kinds was added to the manufactures. Holland, that stout material we use so much for pinafores and curtains, still bears the name of the country where it has always been largely made.

But all the time when the trade and industry were growing, amidst constant scenes of violence and fighting in the streets of the flourishing towns, the struggle against the elements for possession of the country was ever going on. Did the fierce winds heap up the sandhills on the shore, the Netherlanders planted coarse grass to bind it together to make a rampart against further encroachment. Did the river overflow its banks, they were strengthened and heightened, and so by degrees, by patient trial and endeavour, that wonderful skill was attained in building dykes to withstand even the onward rush of the stormy tide, and in making canals and draining lakes. Sometimes, as we have seen, the giant ocean had his way. It was in the thirteenth century that he rushed inland and formed the Zuyder Zee. For years past plans have been maturing to drain this great body of water and restore the land to cultivation.

THE MAKING OF THE DUTCH RACE AND ITS GREAT FIGHT AGAINST TYRANNY

All this effort for generations produced a wise and determined race, few in numbers, and living in a small country, yet able to resist in the fifteenth and sixteenth centuries the fierce tyranny of the most powerful of the sovereigns of Europe.

For a dark cloud began to grow over the Netherlands when by seizure, purchase, succession, marriage of heiresses, the most considerable of its states passed under the sway of the Dukes of Burgundy. We read on page 2966 how these dukes wished to annex

PEOPLE OF THE NETHERLANDS LONG AGO

This picture, by one of the old Flemish masters, shows the dress of Dutch ladies in the middle of the 17th century. The four ladies whose portraits we see are the managing committee of the hospital for lepers at Amsterdam.

Here we see the child life of the Netherlands in the days when the Dutch were at the height of their prosperity.

The houses of the old Flemish merchants were plain, roomy dwellings, each entered through a courtyard.

This painting of a burgomaster, or mayor, with his wife and family, shows the dress worn by the Dutch people of the better class in the 17th century. We see the costumes of a child and of men and women, old and young.

Switzerland as well as the Netherlands and make one long independent kingdom between France and Germany. The crafty Louis XI. had very much to say about this, and was at constant warfare with Duke Charles the Bold. From the daughter and sole heiress of this bad as well as bold man were wrested charters of privileges, commonly called the Great Charter—afterwards the foundation of greater liberty by the first regular assembly of the States General, the members of which were sent from the provinces and great cities of the Netherlands.

This young duchess, Mary, married Maximilian of the Hapsburg family, Duke of Austria, and later Holy Roman Emperor. Their son, Philip, succeeded to his mother's dominions, and he married Joanna, the daughter of Ferdinand and Isabella of Spain, elder sister of Catherine of Aragon.

This son was the famous Charles V., who gathered into his hand the rule of the Netherlands with that of Spain and Austria. All these countries hated each other, and the liberties of the Netherlands were in terrible danger from a prince who firmly believed that he had the sole right of disposing of the persons and lives of his subjects, as well as settling their faith and religion.

THE SPANISH TYRANT WHO PERSECUTED THE PEOPLE OF THE NETHERLANDS

Charles, in spite of his wide empire, was always in want of money, and he required the rich cities of the Netherlands, especially of Ghent, to furnish it whenever he chose to ask for it, and when denied, took away all the charters and rights of those who opposed him, and fined and executed the citizens. Hard as this was, especially when trade from different causes did not bring in so much wealth as formerly, it was not to be compared with the suffering brought upon the country through Charles's tyranny in matters of religion.

We know how the teaching of Luther raised a storm in Germany and in England. That of Calvin, another reformer, powerfully affected France and the Netherlands, and in these countries the rulers hated and feared the Protestants not only because their beliefs went against the supreme power of the Church, but because they denied the absolute power of the rulers themselves; and so as the Netherlanders became more and more convinced that the Reformation was right, and bent all the strength of their determined natures to uphold it, the more bitter became the persecution of those in power, in order to stamp it out. Charles established the terrible Inquisition in the Netherlands, and some of the reformers were burnt under his orders.

A MAN WITHOUT PITY, WHO SENTENCED A WHOLE NATION TO DEATH

His son, Philip II., carried out his father's plan only too well, and when the Dutch rose in rebellion and destroyed many churches and broke up the monasteries, he sent the Duke of Alva, a most clever soldier, and a man absolutely without pity, to suppress them. Almost the entire population of the Netherlands was sentenced to death without even the form of a trial, and people were suddenly seized and put to death without farther warning, till there was not a family who was not bereft.

A national hero rose up at this time, William the Silent, Prince of Orange. His ancestors had done good service to the House of Burgundy, and William was brought up under the eyes of Charles V. When the worn-out emperor laid down all his crowns to go into a monastery, it was on William's arm that he entered the great hall at Brussels, capital of the Duchy of Brabant, where the brilliant ceremony of renunciation took place.

William very soon ceased to be friends with Philip of Spain, though for years he was called his lieutenant; and after he openly became a Protestant he was the leader of the opposition to the bloodthirsty Alva. The patriots called themselves, at first in grim joke, the Beggars. Sometimes they won, especially at sea, sometimes the Spaniards had the best of it, and the struggle went on for many years under different governors and generals.

HOW THE MEN OF LEYDEN CUT THE DYKES AND SAVED THEIR CITY

Stories of the heroism shown in this war of independence are told of nearly every town, every acre of the Low Countries. The sieges of Haarlem and of Leyden are amongst the most memorable. Leyden held out a whole year, except for a brief respite, and the

EVERYDAY LIFE IN HOLLAND TO-DAY

The picturesque life of the Dutch people to-day is well illustrated in this beautiful picture by Mr. G. H. Boughton, R.A., showing a number of Dutch lasses weeding a stone pavement by the side of a wide canal.

The homes of the Dutch are very quaint and clean, and the household crockery is always proudly displayed.

There is no mistaking the national costume of Holland, as seen in the caps and dresses of these little Dutch girls.

Holland's splendid naval history, and the great fight of the people to keep the sea from invading their country, prove that the Dutch are by natural instinct masters of the waves. The Dutch children are, from childhood, perfectly at home in the water, as may be seen from this picture of boys and girls playing in the sea.

The photographs on these pages are by the Photochrome Co., F. Hanfstaengl, and others.

heroic defenders were reduced to awful starvation, but still would not give in. There were fights on the slippery ice in the bitter winter. As a last resource, the dykes were cut, and the water flowed over the hardly won fields, sending the Spaniards away in haste lest they should be drowned; but now the ships that had been waiting almost within sight could come right up to the walls of the town, bearing the precious food to the starving inhabitants.

After a while the provinces of Holland and Zeeland united; and when they felt strong enough they took the important step of renouncing in words the authority of Philip. Elizabeth of England, of whom we read on page 848, helped them cautiously. One of the bravest of the English volunteers who pressed across the North Sea to help the Netherlanders was Sir Philip Sidney, whose story is told on page 467. It was he who, when dying, handed the precious cup of water, untasted, to another wounded man, saying: "Thy necessity is greater than mine."

How the children cried in the streets when William the Silent was killed

But scenes of war, of sacking fine cities, of senseless cruelty in persecution, could not last for ever, and after several unsuccessful attempts at union among the provinces, and at making peace with Spain, in 1581, Dutch independence was declared. William the Silent, "Father William," as he was affectionately called, was the head of the new republic. It was nearly seventy years before Spain gave up all claims and titles, and acknowledged the complete independence of the Dutch.

Three years after the Declaration of Independence, the wisest man in Holland was murdered by a ruffian hired by Spain. As long as William the Silent lived he was the guiding star of a brave nation, and when he died the little children cried in the streets.

War still went on under his son, Maurice, and the southern states, with their great towns of Antwerp and Ghent, and many others, were reduced to obedience to Spain for many years after the northern states became free. Protestantism had been stamped out, the brave and clever Flemish workers had been driven away to Holland or to England, to their great and lasting benefit, and the subdued country lay in poverty and exhaustion. Ten years after the rout and ruin of the Armada, started by the fire-ships and the storm off the coast of Flanders, Philip II. died, after a reign of 42 years.

Philip the Second, one of the great destroyers of mankind

He has been called the destroyer of mankind, for he sacrificed very many lives to his ambition and his belief. We can think of him sitting at his desk in his palace in the Escurial, planning the affairs of the world—the oceans were to him but Spanish lakes—coolly arranging assassinations and executions; squaring his money matters—his bribes and his losses. And then his long day was done.

It was in 1600 that Queen Elizabeth formed an East India Company to trade abroad, as all commerce had been so hindered by the ambitious plans of Spain. Holland followed suit two years later. Much money was spent on fleets and ports and factories; and from these days the sailors of Holland—trained in the wild fishing-grounds of the North Sea—were to be found all over the world taking possession of the Spanish and Portuguese colonies, and often hotly contesting with the English. New Amsterdam, afterwards New York, was founded across the Atlantic, and to this day both city and people bear witness to the Dutch founders. The city of Batavia was founded in Java, called after the old island province, the kernel of the mother country, and the New Batavia is the headquarters of the Dutch colonial empire to this day. Amsterdam and Rotterdam and all the old cities now revived, as trade flowed in with the arrival of ships laden with "sugar and spice, and all that's nice," at the busy quays.

How the lakes and marshes were changed into rich meadow lands

As soon as peace gave leisure, pumping works were established to drain lakes and marshes, and the rich meadow land thus gained fed the finest cattle in Europe. Dutch butter and cheese have long been famous all over the world. Other uses to which the land gained from the sea was put were to grow roots for food and various kinds of hay, besides bulbs of beautiful flowers like tulips. The Dutch taught all Europe

how to garden and farm. At this time, too, Holland became the printing-house of Europe, sending out thousands of books of history and travels, law and medicine. Trades, too, such as diamond-cutting—still largely carried on at Amsterdam—gave employment to very large numbers of skilled workmen. It was in the seventeenth century that the rivalry between the Dutch and English on the high seas came to a height. There were many famous admirals, many brave seamen on both sides. Van Tromp and De Ruyter are names as well known to us as Blake and Monk, and for years they tried to sweep each other off the narrow seas. London was in a panic when De Ruyter sailed up the Thames in the inglorious days of Charles II., and sometimes the obstinate sea battles lasted for three or four days, when both sides belonged to a stock that never knows when it is beaten.

In the age of Louis XIV., France made several conquests in the Spanish Netherlands which had passed to Austria, and Holland, too, had its share of French aggression. To save the country, the dykes were opened. Later, the waters froze, and when the French troops were marching over the ice to attack the Hague, a sudden thaw alone saved the country from destruction. The head of the republic at this time was the great-grandson of William the Silent. His name was also William, who married Mary, daughter of James II. of England. When England could no longer bear the tyranny of the Stuarts, William, with his wife, was invited over to be king in James's place. He helped to restore old laws and liberties, and to strengthen the position of the reformed religion. In the eighteenth century the importance of the united provinces of the Dutch Republic became less than it had been in the seventeenth, and there were many disturbances in the country, which led to the interference of the King of Prussia. But the French Revolution was at hand, and before long the map of Europe was completely changed, and bewildering changes came to the Low Countries, both north and south. The seven united provinces were turned into the Batavian Republic, and a few years later Napoleon turned it into a kingdom for his brother Louis. But that did

HOLLAND AND BELGIUM, SHOWING THE RIVERS AND TOWNS

not last long. He soon took his brother away, and joined Holland and all the other provinces to France. "They are but the sediments of French rivers," said he, "and therefore clearly belong to me." The decisive battle, about which we read on pages 1095 and 2480, which confirmed the downfall of Napoleon, was fought at Waterloo, not far from Brussels.

THE BIRTH OF THE MODERN KINGDOM OF BELGIUM

When the Congress at Vienna remade the map of Europe, the whole of the Netherlands was joined into a single kingdom under another William, Prince of Orange. But the northern and southern provinces did not agree about religion—the south being chiefly Roman Catholic—and they differed on many other matters, too; so, in 1830, they revolted, and the old Spanish Netherlands, that were afterwards Austrian, became the Kingdom of Belgium, under a German Prince, Leopold of Coburg.

The northern provinces went on as the Kingdom of the Netherlands, or Holland, under the Prince of Orange. The descendants of Leopold and William are still on the thrones of the two countries.

Belgium has made immense strides in the course of years, and is now one of the most densely populated countries in the world. The great coalfield of the north of France passes into Belgium where the railway lines are so thick, and there are mines of iron and zinc and factories of all kinds, where thousands of people toil hard. Liège, on the Meuse, is a great engineering centre, and in many towns linen is made from flax grown in the neighbourhood, and bleached with the waters of the rivers.

Ghent is the chief textile centre, making both cotton and woollen goods. Great quantities of sugar are made from the beetroots that grow in the fields. Belgium is also famous for fine lace.

A WONDERFUL PRINTING-HOUSE THAT HAS REMAINED UNCHANGED FOR 300 YEARS

It is a wonderful sight to watch the shipping from all parts of the world at Antwerp, from whose quays and docks the industrious kingdom sends away a great deal of its work, and receives the greater part of its raw material.

Among the surpassing interests of Antwerp is the famous old printing-house, the Musée Plantin, with the types and tools all left in their places, just as they were used in the sixteenth century when the firm of Plantin printed prayer-books for Philip II.

In the cities of both Belgium and Holland the story of the past is perpetually before our eyes. Fine cathedrals and churches, grand town halls and buildings of all kinds, together with the pictures and relics they contain, are like speaking witnesses which link the past with the present.

Between Amsterdam and the sea is the famous North Sea canal, which saves ships going round the peninsula of North Holland. It is about fifteen miles long. Both at Amsterdam and Rotterdam the trade is enormous, and deeply interesting are the pictures and collections, especially at the Ryks Museum at Amsterdam. Here are not only models of the ships that swept the seas in the time of Cromwell and Charles II., but some British colours, and a piece of the Royal Charles, captured by the Dutch at Chatham. The portrait of De Ruyter is close by.

WATER, WATER, EVERYWHERE, BUT NOT A DROP TO DRINK

Let us now mount the Cathedral Tower at Utrecht, and as we look over the wide view, at the dykes, the canals, the windmills, the cultivated fields, the busy towns, we think again of the centuries that have passed since the Batavians settled in the island held in the arms of the Rhine.

Holland is one of the oddest and most amusing countries in the world. Though water is everywhere, there is often not a drop fit to drink, and people have to buy it by the pailful, as they often buy some fuel to boil their kettles. From the high dykes frogs can look down on the birds, and in the damp fields the cows wear coats. Water omnibuses ply for fares on the canals, and coal and peat are brought by brown-sailed boats, which are hitched up to the door, like a horse. The peasants wear beautiful gold ornaments, and costly lace on their heads, and often perch a shabby French bonnet on the top of it. Dogs draw little carts with brass jars full of milk. The brass and copper shine like gold, and everything that can be scrubbed is scrubbed at least once a week, even the big stations.

The next story of Countries is on page 3591.

The wonderful effect that motion has upon matter is well illustrated in this picture. A candle, if pressed against a wooden board, would be pressed out of shape. But fired from a gun, so that it travels at a great speed, the candle will go right through the wood without itself being injured.

HOW MOVEMENT CHANGES MATTER

THE WONDERFUL FORCE OF MOVING THINGS

CONTINUED FROM 3344

We must now go on to another part of the Story of the Earth. We have already a good idea of what the earth is, and we have studied some of the other worlds in space, in order to learn more about the world we live on. We have learnt also about the different kinds of elements that make up the earth and the sun and the stars, and the way in which those elements combine with each other. If we are to use big words, then we can say that we have studied geology, and astronomy, and chemistry, and geography—not the geography that deals with frontiers and cities, but natural, or, as it is called, physical geography; and, lastly, we have studied agriculture.

There still remains to us a very important and very big study, the special name of which is physics, a name derived from the Greek word for Nature. By physics we now mean the study of motion, heat, light, sound, and electricity. Of course, there is no real division between physics and some other sciences, like chemistry, and we cannot understand the one without the other. Nature is not made in water-tight compartments, though I am afraid we often talk and think as if she were, and as if our minds were. It is only for convenience, and because we cannot see everything at once, that we have to study one thing at a time. So here we shall go on to study motion, which is very much more interesting than perhaps it sounds.

When we look at the world around us or at our own bodies, we find that there are two things to catch our eye, matter and motion. In many parts of this book we read about matter—what it is made of, and the way it is put together to form rocks, and planets, and stars. We cannot say anything more about matter itself here, except simply that we do not know much about it. Thirty years ago, men thought they really did know all about matter. Now we know that all we have learnt—and we have learnt a great deal—is only just the beginning. But, at any rate, we know what we are talking of when we use the word "matter," and we can go on to study the thing that is called motion.

Now, motion is not a "thing" in the sense that matter is, and yet it is real. If a boy observes the difference between holding a baseball in his hand and stopping that baseball when it is hit hard in his direction, he will know that motion is real. Or if we notice the difference between our feeling when we jump off a single step into the water and when we dive from a great height, we shall know that motion is real. We are beginning to believe that it is more real than matter,

and that matter is really a state of motion of something that we call the ether.

This is so important, and new, and interesting that we must try to understand it. We believe that everywhere throughout the world there is something called the ether. People have laughed at it, and said it was just imagined, but it is probably the most real of all real things except mind. If mind, by means of which we learn about other things, is not real, then nothing is.

How movement helps to make light and heat and to make matter real

Now, when the ether is doing nothing, we are not aware of it; nothing happens, it might not be there. But when the ether begins to move—and it may move in many different ways—then many things begin to happen. That is one good reason for saying that motion is very real. If the ether moves in a particular way, as we shall learn afterwards, there is produced the thing we call light.

Light and radiant heat, the kinds of invisible light about which we shall learn, including the X-rays, and also electricity and magnetism—all these are states of movement in the ether. Now, if we have the least idea of what these things count for in the world, it is quite evident that motion is a very real and important thing. But that is only just the very beginning of what there is to say about it. We are learning that not only the air, but hard matter, such as rock or steel, is also a state of motion in the ether—a different kind of motion from that which produces light and heat, but a state of motion nevertheless.

Heat, we know, means two things, the radiant heat which comes from the sun or a fire, and is a movement of the ether, and the heat of a hot object when we touch it. This last heat, we believe, is due to a to-and-fro movement—a vibration, as it is called—of the atoms and molecules in the hot thing. So this kind of heat also is due to motion.

A chain that spins and becomes like a hoop of solid steel

But now let us think a little further of what this means. As a rule, when a thing is made hot it gets bigger. This means that part of the size of the thing is due to its heat—that is to say, to motion. May it not be that the atoms and molecules themselves owe their existence to motion? There are many experiments—and these are being increased every day—that make it probable that this is true. One of the most remarkable of these may be mentioned, and if we have a chance of seeing it done anywhere, we should certainly do so. Can we believe that the hardness, the stiffness, the firmness of a thing can be made simply by the fact that it is moving? If we could suppose this, then we could suppose that the movement of the ether could make it into matter—which we, of course, think of as something hard. Now, if we take a ring of chain, which, of course, simply lies in a heap huddled on the floor, and if we get hold of it in such a way that we can make it spin round at a tremendous rate, it becomes quite stiff, as if it were made of one piece of solid steel, and it will run for a long distance like a stiff hoop until the spinning, or rotation, of it has been exhausted, and then, of course, it will collapse into a little heap of links as at first. The rotation made a thing with no stiffness into a stiff thing.

How a candle can be fired through a wooden door

Another wonderful illustration of this is the firing of a candle through a wooden door, the motion imparted to the candle enabling it to make a hole through the wood without itself being injured.

Again, we may take a piece of quite soft tissue-paper, stretch it out and spin it at a great speed. It will cut anything we please, just like a knife. Yet it is only a piece of soft tissue-paper. We have made it hard by making it move. It is possible to show experiments like this, one after another, for an hour on end, every one of them showing that the properties which we think of, when we think of a piece of rock or stone, can be created in things that have no such properties, by making those things move in certain ways.

But by far the most wonderful experiments are those we make with rings of smoke. A smoker can blow from his lips rings of smoke, or we can inject smoke into a square box with a hole in it and an elastic back, and then by hitting the back we can knock rings of smoke out through the hole. These rings are just the same as the smoker makes, but much larger and more easy to observe. Before we can notice what these rings do, or can understand at all what

we see, we must learn two things. The first is that the smoke—that is to say, the little specks of stuff that make the ring visible—has nothing to do with the question. We cannot do without the specks, just because they make the ring visible. The real ring, however, is not a smoke ring, but an air ring. Equally good rings are made by hitting the box when we have burnt nothing in it; and we can blow as perfect rings from our mouths when we do not smoke as when we do. Very few people understand this. They think that the smoke is necessary, but the smoke merely shows us the ring.

The second thing to remember is that the ring of air, or gas, has another and distinct motion. It moves through the air, we know, for we can see that. But the point is that the portions of gas that make it up are themselves in movement, and this second movement is something like that which we get if we take an india-rubber ring, and run it along a rod which it fits tightly. The ring keeps on turning itself inside out. Well, a smoke ring, as we call it, moves in this way, and the special name given to it on that account is "vortex ring." The word, like many other English words with v, r, and t in them, means turning and twisting.

THE MARVEL OF A RING OF SMOKE THAT CANNOT BE DESTROYED

So a smoke ring is really a portion of the air which, unlike the air around it, is in a peculiar state of motion, and we find that this peculiar state of motion gives it the most extraordinary properties. For one thing, it lasts a long time, and retains its independence of the air around it, and it resists attempts to destroy it. We cannot cut it with a knife. If we try to do so, the ring dodges us. One ring may be blown through another, but we cannot make one ring smash another. Now, all this, and much more, entirely depend upon the way in which the air that makes the rings is moving. This motion confers upon the rings the power of resistance. It makes them, like the atoms of matter, very difficult to destroy. It gives them a sort of hardness, just as the spinning of the steel chain gives it hardness. Lord Kelvin, the greatest man who has studied these questions since Newton, supposed that matter may be made up of things like vortex rings. It may be that the ether, by being put into a special state of motion, becomes matter, just as by setting the air into a special state of motion we can turn parts of it into special separate things, like smoke rings.

THE WONDERFUL RING THAT MAY EXPLAIN THE MYSTERY OF THE UNIVERSE

This vortex-ring theory of matter is the most famous theory of the kind that has ever been suggested, and in all probability it expresses a great part, though doubtless not the whole, of the truth. We shall agree that it justifies what was said at first, that perhaps motion is more important than matter. That must be so if motion makes matter. All over the world, men are now studying the nature of matter from this point of view. The electrical theory of matter which they are now studying is really a sort of version of what we have been saying, and every year we shall hear more about this subject.

Meanwhile, we must learn some other things which teach us how important motion is. When we stop a moving baseball, we know that there is power in it, and that it requires power to stop it. Now, the baseball is the same after it was stopped as it was before, but that power is no longer in it. Its motion was its power. When a train, or a motor-car, or a flying-machine moves, we know the power is coming from somewhere. In every one of these cases, the power is produced by the pressure of a gas, that is somehow or other made in the engine of the machine.

A gas is made in such a way that it wants to expand or stretch itself, and as it does so it drives the engine. This pressure of gases is one of the most important things in the world. Where does it come from? Many men, working together, and after each other, have proved during the last century the truth of a beautiful theory that is called the kinetic theory of gases.

THE MILLIONS OF MOVING ATOMS OF GAS THAT DRIVE THE MOTOR-CAR

Everyone knows that a kinematograph is a moving picture, though we often spell it with a c, and pronounce it as if it were an s, which only confuses us. The word comes from the Greek word for motion, and so the kinetic theory of gases simply means

the theory that the pressure and the other properties of gases are due to the movement of the little atoms and molecules that make up the gas. This is now proved to be true. It is the little motions of unthinkable millions of molecules that make the big motion which we see of the train or the motor-car. It is the adding together of these tiny little motions that makes great masses of rock fly into the air when we cause an explosion, or that sinks a battleship when a torpedo, or submarine mine, explodes. Never was there such a good illustration of the proverb that "mony a mickle maks a muckle." Motion is power, and the big motions that we see, and all their power, are due to the little motions we cannot see. There is another most extraordinary thing which very few people have thought of, but which should make us interested in motion if nothing else does.

THE ONE AND ONLY THING THAT HUMAN BEINGS CAN EVER DO

Here are we human beings, who could not live for a minute without the motion of the blood in our bodies; and we are become the lords of the earth; we have changed its surface so much that men upon the moon could see the difference we have made. We rule other living creatures; have built great cities and ships; have learnt many of the secrets of the stars. And yet when we look upon ourselves and ask what it is that we can do, what it is by means of which mankind has done and will do everything, the answer is simply that we can move things. That seems absurd at first, but it is absolutely true. There is nothing that any human being has ever done, or ever can do, that does not depend upon his power to move things. All he can really do is to move his own body, in part or as a whole, and so, by pushing against other things outside him, he can scoop a hole in the earth and live in it, or put together machines that will build a palace.

We move our chest, and lips, and tongues, and so we speak, or we move our bodies to get hold of something that will make a mark; we move our fingers round that something, and then move it on something else, and so we write. We have done wonders, and we shall do much greater wonders yet; but all we can do is to *move things*. The lesson to be learnt from this is how great the result of the mere movement of things may be. Indeed, just as all the doings of Nature depend upon movement, so do all the doings of man.

HOW WE ARE ABLE TO KNOW WHEN THINGS ARE MOVING

We have only to think of the apparent motion of the sky as the earth turns, or of the way in which we may be puzzled to know whether our train, or the train on the other line, is moving, to understand that we only know the movement of a thing by comparing it with something else. The only motion we can understand is relative motion. If there were just one point in the universe that could think, and there were nothing else in all space, that point could, of course, move about. But no one can imagine any means by which it could know that it was moving at all, much less the rate or direction of its motion. All we know, then, is motion as compared with something that is not moving, or that is not moving in the same way. Thus the whole universe of stars may be moving, but whether it is doing so, and, if so, in what direction and at what speed, no one can say, because there is nothing against which to test this motion. If the ground runs along under a runner as fast as he runs, how shall we measure his running? And this applies alike to trains, and stars, and everything else.

A solitary thinking *point* and not a thinking *person* has been suggested, and the reason for that was that there are two kinds of motion which a person might undergo, just as there are two kinds of motion which we see in a smoke ring. The smoke ring can move as a whole, and its parts can twist and turn among themselves.

HOW OUR BODIES ARE WHIRLED ALONG WHILE WE SIT QUIETLY IN A CHAIR

So we also can move about from place to place, or we can double ourselves up without moving away from where we were. If one of us were utterly alone in space, he could learn what motion was by moving his body about, but he would know no more of the motion of his body, as a whole, than we do when we sit quietly in a chair, not knowing that in every second of time our bodies are moving many miles with the earth. Motion from place to place is often called *loco*-motion, which just means

place-motion; and we call a machine for producing such motion a *loco*-motive. But the proper name for this kind of motion is *translation*, and we compare that with *rotation*. Translation literally means carrying across; rotation, we know, means spinning, and a thing may be undergoing either of these kinds of motion, or both. When a base-ball is batted, the batter usually so arranges that it has both a movement of translation, which we can all see, and a movement of rotation, which we see the results of when a ball touches the ground or swerves in the air. As the earth flies through space it has both movements, the translation making the seasons, and the rotation making day and night. When translation of any body occurs, rotation is quite difficult to avoid. Drop a book or a ball from a window, and we find it very difficult to prevent it from twisting as it falls.

THE SLOW SHIVER OF THE EARTH UPON ITS AXIS

Along with these two kinds of movement, there is a third, which is a movement of vibration, or trembling. This to-and-fro movement, which we can feel in ourselves when we shiver, is not the same as rotation. It is really a movement of translation, but as it is constantly reversed, the moving thing does not change its place altogether. A wave is an instance of a movement of vibration, and we must clearly understand what many people find difficult, that the point is not the rate of the vibration. The to-and-fro movement may be millions of times a second, or it may be only once a second, or even slower still. The to-and-fro swing of the pendulum is a true vibration, and would be a true vibration if it were a million times quicker or a million times slower. The axis of the earth seems to undergo a great vibration, or to-and-fro movement, which is quite distinct from its movement of translation and its movement of rotation, and the period of this vibration—to use the proper term—is not one second, as it may be with a pendulum, nor yet less than a billionth of a second, as it may be with a wave of light, but about twenty-five thousand years. Yet it is a vibration. These three words, translation, rotation, and vibration, we should always remember when we think about motion.

When we study the universe as a whole, and find things in motion about us, the first question we are bound to ask is: Where does this power come from? The only answer to this question is that it comes from the great Cause and Author of all things. He is the first and ultimate cause of all motion.

THE GREAT LAW THAT MOTION AND POWER ARE NEVER LOST

If now we ask what are the nearer causes, we make one great discovery, which is the greatest discovery ever made by science, and which is often referred to in this book, and in every other book that deals with science at all. This discovery is that motion, like power in all its other forms, is never made out of nothing, and never lost. This was guessed by the first of the Greek thinkers, Thales, some 2,500 years ago, and it was proved once for all in the nineteenth century.

Wherever we find motion, there we know there must have been either some other motion, of which this that we see is the continuance, or else some power has been spent somewhere to produce it. When a ball leaves the arm, the motion of the ball and the power of it have been derived from the power in the sugar of our muscles when the ball was thrown. And so in every case. This great principle, which is true not only of motion, but of everything else, has a special name, which is rather long, but is not really difficult. It is called the *conservation of energy*. Energy is just a special word for power, and the law of conservation states that power is never lost; it is also part of the law, though the name does not say so, that power is never made out of nothing,

One of the ways in which this shows itself is in what is known as Newton's first law of motion. Everyone should know this, for it applies to everything. It is often called the law of inertia, which simply means "doing nothing."

WHY MOVING THINGS DO NOT GO ON MOVING FOR EVER

This law says that when a thing is moving, it does nothing itself to change its motion. It therefore will go on moving for ever, and in exactly the same direction, and at exactly the same speed, unless and until some other power stops it, or turns it, or makes it go slower or faster. That is half of the law of inertia, but only half of it; and it is

given first because it is the half that people usually forget when they talk about inertia. The half that most people know is really the same thing, but looks different. It is that when anything is at rest, it remains at rest, doing nothing, until something moves it. Whenever we think of inertia, or Newton's first law of motion, we should remember both halves of it, or, rather, the two ways in which it works out.

WHY A BALL FALLS WHEN IT IS THROWN INTO THE AIR

Everyone understands how it applies to a thing that is not moving, but very few people remember how it applies in the other direction. They do not know that a thing which is moving will not stop unless something stops it. We see a ball thrown up into the air, or thrown over the surface of the earth, and we know that the motion ceases. This is our experience with practically all motions, and so we get the idea that when a thing moves it gets tired, after a time, and stops. It was one of the most tremendous discoveries ever made that this is not so, and that the smallest touch applied to the biggest thing, sufficient to move it at all, will keep it moving at that speed and in that direction for ever, without its ever getting tired. When the ball thrown up is stopped, the earth by its pull stops it, and the resistance of the air helps also in the stopping of the ball.

When a ball running along the ground stops, it does so, not because it has a tendency to stop, but because the resistance of the air and the friction of the ground stop it. The real tendency is for the thing that is at rest to remain at rest, and for the thing that is moving to go on moving. If we think of the matter, we shall see that if things did not behave in this way, the law of the conservation of energy would not be true.

THE GREAT LAW OF NEWTON THAT EXPLAINS WHY THINGS STAND STILL

If things could be started moving without anything moving them, then power, or motion, would be made out of nothing; if moving things could be stopped without something stopping them, then motion, as we can easily see, would be made into nothing. That is what we mean when we say that Newton's law is really a special illustration of the great law of conservation.

Newton discovered two more laws of motion, thus making three, which will always be known by his name. The second law is quite simple. It says that when anything is made to move, its motion is in strict proportion with the force that makes it. Further, the thing moves in the direction of the straight line in which the force acts. This is true, no matter if there be twenty different forces acting in different directions upon a body, and it is true whether that body be at rest or already in motion.

Using this law, it is possible for us to find out exactly in what direction, and at what rate, a body will move if we know the power and the direction of any number of forces that may be acting upon it. We discover also the profound truth that rest is a state of balance of forces; forces are pulling, but other forces are pushing. These exactly oppose each other, and so the result is rest. Gravitation is pulling this book as it lies on the table, but the strength of the table resists the force of gravitation, and as it acts in exactly the opposite direction to that force, the book remains at rest.

HOW A GUN HELPS US TO UNDERSTAND THE LAWS OF MOTION

Newton's third law of motion is that "action and reaction are equal and opposite." This great law, which is really, when we come to examine it carefully, another version of the law of the conservation of energy, is very well illustrated in the kick, or recoil, of a gun when it is fired. The amount and force of the rifle as it kicks back are exactly equal and exactly opposite to the amount and force of the bullet as it goes forward.

We shall next have to name briefly three other laws of motion which we know by the name of Kepler's laws. We must not confuse them with Newton's laws, but they are in some ways just as important, because they lead up, as we shall see, to Newton's greatest discovery, the law of gravitation.

All these laws are of supreme importance, and though we may not be able to understand all their details, we should certainly know something about them, for the existence of the universe, including this world on which we live, depends upon them.

The next part of this is on page 3547.

THE HEROINE OF NOTTINGHAM CASTLE

CONTINUED FROM 3254

ONE of the brightest stories from the Civil War in England is the defence of Nottingham Castle by Colonel and Mrs. Lucy Hutchinson. The building in the picture stands on the site of this famous old Norman castle. The king set up his standard on August 22, 1642, at Nottingham, near which the Hutchinsons lived. The whole country was in a ferment, and Ireton, their neighbour and relative, urged them to support the parliamentarians, which they did. Mr. Hutchinson received a commission as lieutenant-colonel, and the family removed to Nottingham for greater security. Soon, as Governor of Nottingham Castle, Colonel Hutchinson had to defend it.

For four years Mrs. Hutchinson was shut up in the castle, acting as surgeon during the siege, tending the sick, supplying food for the big household, medicine also, where it was needed, and ever cheerful and wise in her counsel.

She shared all her husband's plans, approved his stern refusal of the many attempts to bribe him into submission, and showed in the notes she wrote down at the time that she must have witnessed scenes and undergone anxiety enough to quell the stoutest heart. There were her little children, too, who needed her constant care. Newark, a neighbouring town, was on the royalist side, and many of the citizens of Nottingham were also royalists. One of them during the night secretly let the Governor of Newark and six hundred soldiers into the town. Next morning the colonel found himself besieged in his little fortress with eighty men. Enemies were all around, but messengers got through and sent for succour to the garrisons at Derby and Leicester.

On the third day Colonel Hutchinson was invited to parley with the royalists in St. Nicholas' Church. His answer was to hoist a red flag on the tower of the castle and to fire his cannon at the church steeple. Two more days passed, and then, to their relief, the watchers on the tower saw a party of horsemen galloping to their assistance. As these men drew near, the royalists retreated, but not without a sally from the besieged, so that they retired in confusion.

When the war was over, Mrs. Hutchinson acted as peacemaker between a band of soldiers preparing to attack the town and the citizens arming for its defence, and later, when the Stuarts came back to power after Cromwell's death, she worked to secure her husband's pardon. It was denied, and the brave wife cheered and comforted her husband in prison in the Tower, and afterwards in Sandown Castle, until his death.

THE BOY ON THE BURNING DECK

From Corsica came a youth, the boy who "stood on the burning deck," whose fame is known to all through Mrs. Hemans' poem, given elsewhere in this book. The Corsicans say that he was Giacomo Jocante Casabianca, a middy who went in the Orient, the flag-ship commanded by his father, with the French fleet that Napoleon took to invade Egypt.

On the evening of August 1, 1798, Nelson sailed up to attack the French vessels as they lay in Aboukir Bay; and some of his ships, getting between the French and the shore, fired on the French from both sides at once.

The English guns were pointed for hours at the Orient, the finest ship of the fleet. Broadside after broadside was fired at her, yet still the French flag waved; until from Nelson's Vanguard a deadly fire wounded the captain, and set fire to the vessel. Inch by inch the flames drove back the sailors, and, one by one, they reluctantly abandoned their guns. Then Casabianca's father, mortally wounded, yet still at his post on the quarter-deck, gave his last order to the faithful defenders of his vessel to abandon her.

Begging him to come with them, they sprang into the water, where many were saved by the English. It was now between nine and ten in the evening, and the flames crept on, while the boy urged his father to jump into the sea with him. The father refused to desert his ship, but prayed his boy to leave him. The son leave his father! No. That was impossible for a Casabianca. He would die with him.

And so the two stood calmly, hand in hand, while the flames shot up from the portholes, and the deck caught fire beneath them. At last the end came; and, with a thunderous explosion, the burning vessel sank for ever beneath the blue waters of the Mediterranean.

THE DEVOTION OF A KING'S DAUGHTER

King Louis XII. of France had a daughter Renée, who became Duchess of Ferrara, in Italy, and a Protestant. She was a gracious helper of all who were in distress. It is said that she aided more than ten thousand destitute French soldiers passing through Ferrara from the wars in Italy, and her castle of Montargis became the refuge of the persecuted Huguenots.

One of these, the Prince of Condé, had been imprisoned by the Duke of Guise; but he had a devoted and clever wife who, while visiting him in prison, managed to change clothes with him, so that she remained in his place while he escaped to Montargis.

This change was soon found out, but the Duke of Guise was foiled in all his attempts to trace the escaped prisoner. Then he bethought him that, if the princess were released, she would follow her husband, so he gave orders to set her free. His guess proved correct; she was followed to Montargis.

The Duke of Guise, who had great power in the land, ordered the duchess to give up the prince, but she refused to do so. Even when the king, Francis II., demanded the same thing, and sent troops, she still refused. The prince in his little room overheard the brave refusal to surrender him, but he overheard, too, the timorous fears expressed by a few of the guards, and, turning to these, he cried that since they had not courage to defend him, his death should remove their fears. He hastened on to the ramparts with the intention of exposing himself.

Below him, at the foot of the castle walls, he saw the officer of the artillery, and shouted to him that he was the man they sought, and that on him alone should vengeance be taken, so that he might die, as he had lived, with honour. Much astonished, the officer sent for his leader, who told him that he must certainly fire on the prince.

But the faithful duchess stood by the prince's side, and, seeing the cannon directed against her friend, threw herself in front of him, exclaiming:

"Fire on me, and kill at the same instant the illustrious Condé and the daughter of the king you mourn!"

The soldiers, who adored the memory of Louis XII., implored with one voice that his daughter should be spared, and, refusing to attack the castle, marched off to their tents. The prince and his friends escaped into safety that night.

THE NEXT GOLDEN DEEDS ARE ON PAGE 3553

THE NOVELS OF THACKERAY

THE first great success among the stories of Thackeray was that of "Pendennis." It began to appear in instalments in November, 1848, and had been preceded by "Vanity Fair," which at first did not attract great attention, but had made the reputation of its author before it was finished. "Pendennis," on the other hand, was a success from the beginning. It is a very long story, describing the life of an imaginary young man, who is very far from being a hero, as his faults are quite as pronounced as his good qualities, and sometimes far more evident. The genius of the author is seen in the fact that, although he never endeavours seriously to win our affections on behalf of Arthur Pendennis, he maintains our interest continuously in his character, which is the most difficult task of a novelist.

THE HISTORY OF PENDENNIS

CONTINUED FROM 3368

THE Arthur Pendennis with whom our story opens is not he whose history it attempts to tell. Major Arthur Pendennis was an elderly bachelor, who, having served his time in the king's army, and retired on his pension, contrived with much ingenuity to cut some figure among the dandies of his day, although his means were of the scantiest. He just missed falling into the ranks of those who are known as the "shabby-genteel," and being a perfect worshipper of rank and title, he was ever to be found where anything was to be gained from association with people more wealthy and distinguished than himself. That is to say, he lived a good deal on the credit which his familiarity with the noblemen of the day earned for him in the minds of those who were not themselves favoured with the friendship of those great ones.

To be quite frank about the old dandy, he was a good deal of a humbug. He even pretended in his manner of dress to be a great many years younger than he really was; but, despite his little whims and pretences, most people liked the major, and few members of his club were more in request than he at dinner-parties.

Major Pendennis was seated one morning in his club, with a little heap of letters before him, most of which were from lords and ladies inviting him to honour them with his presence at their different parties; and he was making mental notes as to how he could fit in the various engagements, which to accept, and which to decline, when all his plans were upset on opening the last letter of the heap. This was written by his nephew and namesake, Arthur Pendennis, and the reading of it sent the major purple with indignation. It is with this Arthur Pendennis that our story is concerned, and later on we shall discover why his letter made the major so ill-tempered.

A good many years before the day on which Arthur's letter was read by his uncle at his club in Pall Mall, Mr. John Pendennis, the brother of the major, and father of Arthur, had carried on business as an apothecary and surgeon in a very unpretentious little shop in the city of Bath. John Pendennis was a quiet, old-fashioned, economical man, and by dint of careful saving he was able at last to fulfil the dream of his life. Selling his business, he bought a little estate near the small town of Clavering, in the west of England, and settled down there for the remainder of his days as a real country gentleman.

This little estate was on the fringe of the greater one of Clavering Park, and, naming it Fairoaks, Mr. Pendennis felt that he could hold up his head with any of the landed proprietors in the district. He assumed all the airs of a gentleman of long lineage, boasting a pedigree that went back to the time of the Norman Conquest. His young wife, who had been a Miss Helen Thistlewood, he had also chosen because she was a very distant,

although very poor, relative of the noble house of Bareacres.

Thus the quaint little snob began quite late in life his new career as John Pendennis, Esquire, of Fairoaks, Gentleman, his humble days when he dealt in drugs and porous plasters quite forgotten. Portraits of great Pendennises of the past, such as Roger, who fought at Agincourt, and Arthur, who carried himself so well at Cressy, and many another Pendennis hero hitherto unknown to fame, came from none knew where to adorn the walls of Fairoaks mansion.

ARTHUR'S FATHER BECOMES A GENTLEMAN AND INVENTS HIS ANCESTORS

You will see that, like his brother the major, John Pendennis was also something of a humbug. The major had but little interest in him while he had been a mere apothecary; but as the Squire of Fairoaks, he was proud of his brother, and delighted to see little Arthur growing up in the firm belief that he was the son of a long line of gentlemen.

Mrs. Pendennis herself was a gentle-natured woman, who had a profound admiration for her elderly husband, and doted upon her boy Arthur. The result was that when Mr. John Pendennis died, and Arthur had reached the age of sixteen, that young gentleman had been spoiled on all hands, and too suddenly became conscious of his own greatness as the new Squire of Fairoaks. His uncle would have had him go back to Greyfriars School and continue his education, but Arthur coaxed his mother to let him remain at home, the lord of his estate.

SOMETHING ABOUT A YOUNG LADY OF IMPORTANCE IN THE STORY OF PENDENNIS

This was the beginning of his many follies, for his home studies were confined to some daily readings in the poets with Mr. Smirke, the curate from Clavering, and the writing of passionate verses imitating the style of Byron, which were published in a local paper. For the rest, he fancied himself a very gay young man, interested in sport, and inclined to regard his mother and his adopted sister, Laura Bell, as very slow-going and old-fashioned, although he had a sincere love for them both.

As Laura plays an important part in the story, we should know something about her here. Long before Miss Helen Thistlewood had imagined she would marry an elderly little gentleman with a bald head, there was a poor young graduate of Cambridge University with whom she was in love. But the Rev. Frank Bell had so long to wait for a church that he and Helen drifted apart, and in the end he went abroad and married there.

It was after Helen had become Mrs. Pendennis that both Mr. Bell and his wife died, and their daughter Laura, who inherited a tiny fortune, was adopted by Mrs. Pendennis. She had proved herself worthy of Helen's love and care, and was now growing into a beautiful and adorable young woman. Laura's admiration for Pen, as her adopted brother was familiarly called, was so frank and whole-hearted that Helen nursed fond dreams of a great happiness she hoped to experience some day, when Laura might consent to please her by doing a certain thing. And in due time we shall discover whether Laura made her happy.

ARTHUR FANCIES HE IS IN LOVE AND BEHAVES VERY FOOLISHLY

We must now return to the doings of Pen, for that handsome young man was certainly as active as he was foolish; and his history, when fully told, is indeed a long one.

It happened one day that, when Pendennis was in the county town of Chatteris, whither he had ridden over to deliver a new poem to the editor of the local paper, he fell in with a very over-dressed and horsy young fellow named Foker, whom he had known at school. Harry Foker was no suitable companion for him, being densely stupid, and interested only in low sports, for which he was well supplied with money, his father being a rich brewer who had married Lady Agnes, sister of the penniless Earl of Rosherwood, to one of whose daughters Harry was engaged to be married. He was a kind-hearted young fool, this brewer's son, and found many people to help him in the spending of his money. Pendennis was greatly impressed by the expensive dinner to which he invited him, and gladly accepted his invitation to accompany him to the theatre, where an actress, whose stage name was Fotheringay, was performing. The play was a great experience for Pen. The actress seemed to him a

HOW PENDENNIS'S DEBTS WERE PAID

"You know, mamma," said Laura, "that I have been living with you for ten years, and you have never taken any of my money. Now, if I had gone to school it must have cost me at least fifty pounds a year, so that I owe you fifty times ten pounds, which doesn't belong to me a bit. So we will go to the lawyer and ask him for the five hundred pounds, and I dare say he will lend you two more, which we will save and pay back; and we will send the money to Pen, who can pay all his debts without hurting anybody, and then we will live happily ever after."

veritable queen of tragedy, and he was back in Chatteris next day to enjoy at the hand of Foker the great privilege of being introduced to the father of the actress.

This person, who was known as Captain Costigan, was an Irishman, much given to drinking and boasting of his tremendous exploits in the "Foighting Hundredth and Third," although he had clearly fallen on evil days, as his clothes were shabby and dirty, and his face, once handsome, had not been improved by his fondness for the bottle.

But, fluttered as Pen had been at the thought of meeting the captain, his delight was unbounded when that frowsy person invited him to meet his daughter, "the peerless Fotheringay." Although she was a beautiful woman, and later on became famous as an actress in London, she was uneducated and stupid; but poor bewitched Pendennis thought her a very queen, worthy of his homage.

"How beautiful she is! How simple and how tender! How well she talked! Emily! Emily!" So he said aloud to himself in rapture as he rode home to Fairoaks that night. Day after day he was a constant visitor to Chatteris to watch her as she acted on the stage, and to take to her the poems he wrote about her beauty and her dramatic power.

While the rascally Captain Costigan encouraged Pen in every way, his daughter received the admiration of the youth, who was several years younger than herself, in a very matter-of-fact and unromantic way. But, to the dismay of all his friends, Pen announced his intention to ask the tragedy queen to become his wife, and had almost induced his mother to give her consent, when Dr. Portman, the vicar, suggested sending for his uncle, the major.

Pen himself determined to write to his uncle, informing him of his mad intention to marry the actress, with whom he foolishly imagined himself to be in love. It was a frank and manly letter that he wrote; but, none the less, as we already know, when old Major Pendennis opened and read it at his club, it threw him into a violent temper, and speedily brought him to Fairoaks.

How Major Pendennis Preserved the "Honour of His Family"

The old campaigner did such good service in the sacred cause of his family by talking with so much reason to Captain Costigan and rendering that needy person a little service, that the captain had no difficulty in persuading his daughter to write a brief note to Pendennis releasing him from his promise to marry her; and although the foolish youth talked wildly of dying, he did nothing of the sort.

Pen wrote many more verses full of sadness and sorrow, and after a time decided that he would go to Oxbridge University in order to study for some career, the exact nature of which was not quite clear to him. Harry Foker and other old school-fellows from Greyfriars were there already, reading for their degrees, though there was not the slightest hope of the brewer's son ever passing. So Mrs. Pendennis had to scrape together all her savings in order that Pen might go away well provided.

Once there he conducted himself more like the son of a rich nobleman than a small country squire. In personal appearance and in mental gifts he was probably better fitted to be a nobleman's son than many who were such in reality, and he speedily became the most popular of all the students. Yet he never did what was expected of him.

Pendennis Lives Like a Lord at the University and Gets into Debt

All the prizes, which, it was thought, he had only to try for in order to win, were carried off by others, and the brilliant Pen contrived to do nothing more original than run deeply into debt. Every penny his mother could find for him was spent, and at the end of two years, when he had failed in his examinations and found himself seven hundred pounds in debt, he fled from Oxbridge to London, where his uncle, who had been mightily pleased to hear of Pen's lordly acquaintances at the university, gave him the cold shoulder on learning of the scrape he had got into.

Thus turned away by the major, who was ready enough to help when the "honour of his family" was at stake, but, desperately poor himself, could take no interest in his nephew's money troubles, poor Pen behaved as many another prodigal son had done before, and, writing to his mother, announced that he was coming home to throw himself upon her kindness, which he had so grossly abused. Mrs. Pendennis, gentle soul, was full of forgiveness for her boy, and there was another who shared with her the determination to help the foolish young man out of his scrape.

"You know, mamma," said Laura, "that I have been living with you for ten years, during which time you have never taken any of my money, and have been treating me just as if I was a charity girl. This obligation has offended me very much, because I am proud, and do not like to be beholden to people.

How Arthur's Adopted Sister Thought of a Way to Pay His Debts

"Now, if I had gone to school—only I wouldn't—it must have cost me at least fifty pounds a year, it is therefore clear that I owe you fifty times ten pounds, which doesn't belong to me a bit. Now, to-morrow we will go to Chatteris, and see that nice old Mr. Rowdy, with the bald head, and ask him for it—not for his head, but for the five hundred pounds, and I dare say he will lend you two more, which we will save and pay back; and we will send the money to Pen, who can pay all his debts without hurting anybody, and then we will live happily ever after."

Thanks to this little plan of Laura's, Pen's debts were paid, and although he had to observe many little economies in his life at Fairoaks, and had to see his devoted mother and Laura stint themselves for his sake, he could think of nothing better to do than the writing of gloomy poetry. It was due to Laura that at length he determined to return to the university, where, behaving very differently, and applying himself to his studies, he took his degree without difficulty, and again came back to his aimless and despondent life of idleness at Fairoaks.

An event of some importance in the history of Arthur Pendennis now happened. Clavering Park, the great mansion of the countryside, was to be reopened, and after many years a Clavering was to be in residence there again. Sir Francis Clavering was a person of very doubtful reputation, and had at one time been an inmate of the debtors' prison, before he went abroad to make a living by means best known to himself. Luckily for him he had married in Calcutta the daughter of a wealthy indigo planter, named Snell, and came into possession with her of a large fortune. She was understood to be the widow of a ship's officer named Amory, who had mysteriously disappeared, and she had one daughter, Blanche. The fact that the Snell fortune had been made in doubtful ways did not trouble Sir Francis Clavering. He was very glad to find in Mrs. Amory a wife who was as good-natured as she was vulgar, and whose great wealth was at his service.

PENDENNIS'S LIFE AT FAIROAKS AFTER HIS RETURN FROM THE UNIVERSITY

It was great news for the district that Clavering Park was once more to awaken into a life of gaiety and activity, and Pendennis was not the least of those interested in the prospect of some new excitement in the dull and purposeless life he was living. His little estate adjoining the great one, meant that Fairoaks would, to some extent, share in the revival of Clavering Park.

Nor was he at first insensible to the charms of Miss Blanche Amory, the daughter of Lady Clavering. This young lady, very fair and pleasant to look upon, had a romantic turn of mind, which led her to poetry of much the same character as Pen had affected. Sadness was the keynote of their thoughts, although neither had any reason for sadness, except the wish to appear romantic, after the style of Lord Byron.

Pen took to fishing in the river, and Blanche also discovered some new interest in walking there. They exchanged their sad and sorrowful verses, and there was a certain hollow tree that made a most romantic post-office, where they could leave letters for each other. But when, in the course of time, the great families of the county, who at first had stood aloof from the Claverings, began to show friendliness to Sir Francis and his family, thanks to the wealth of the widow Amory, Miss Blanche curiously lost her taste for these romantic little walks and the delights of the hollow tree post-office.

PENDENNIS GOES TO LONDON TO WORK FOR FAME AND FORTUNE

After a time, Arthur Pendennis seemed suddenly to realise that he was still far from doing all that he might to make his mother happy, and as he was by no means an undutiful son, although he too often did the wrong thing, he now determined that he would do the right, by going to London and studying for the Bar. After winning a place for himself in the great city, he would return to fulfil the wish of his mother's heart by marrying Laura.

As Pen had been a spoilt child all his life, and had so often found those who loved him ready to make sacrifices on his behalf, he was now not a little surprised and a great deal offended when Miss Laura saw fit to reject the noble offer of his hand and heart, and when he went to London it was with the feeling that he had been very badly treated. The fact was that the selfishness in his nature had been allowed to grow too strong, and he stood very much in need of a wholesome lesson in conduct. It was as fortunate for herself as it latterly was for Pen that Laura had the good sense to teach him this much-needed lesson.

PEN WITH HIS FRIEND WARRINGTON, AND THEIR LIFE IN THE GREAT CITY

In London, Pendennis shared chambers with his old friend, George Warrington, a younger son of Sir Miles Warrington. George was one with whom fortune had not gone smoothly. Although in many ways and at heart a gentleman, he had been foolish enough to marry a woman who was unfit to be his wife, and, as a consequence, he had dropped out of the social world in which he should have lived, and here, in London, down at heel and threadbare, he lived a very wretched life, into which Pendennis, with his newly awakened ambitions and his poetic posings, came like a breeze from the old schooldays.

Pen could not have chosen a better companion than the shabby Warrington, who had still the instincts of a gentleman, and could give the young and thoughtless Pen some sound advice,

for, despite all his good resolutions, Pen was very soon neglecting his studies and giving himself up to lazy and thriftless habits. His money came to an end too soon for his liking, and it was then that Warrington turned upon him and pointed out the meanness of Pen's life, so much of which had been spent in sponging off his mother, and even accepting the assistance of Laura.

PENDENNIS DREAMS OF BECOMING A GREAT POET LIKE LORD BYRON

But Warrington did better than this. He suggested to the erratic youth an honourable way of earning money. Himself he was writing for the papers, and so avoiding the need to borrow from friends. Why should not Pendennis do the same, and better? For there was no doubt that he had considerable literary talents. So Pen would be a poet for pay, and earn great sums of money, as Lord Byron had done before him! Warrington laughed at the absurd enthusiasm of Pen, and induced him to fly at smaller game, with the result that the young Squire of Fairoaks was presently making his way as a contributor to the newspapers and magazines, bidding fair to be a successful journalist. Soon he began to consider himself an extremely noble young man indeed, when he was able to send small sums of money to his mother, though these were but very tiny instalments of the debts he owed to her and Laura.

Occasional meetings with Captain Costigan, who was now in London, where his daughter had married an elderly baronet, and who still retailed his fictitious stories to admiring groups of young men, awakened memories of Pen's earlier follies.

PEN BEGINS TO WIN FAME AS AN AUTHOR AND JOURNALIST

But, although he was not above spending his evenings in the taverns where Costigan and his cronies gathered, he still maintained the grand manner and noble bearing he was supposed to have inherited from his long line of ancestors, much to the amusement of Warrington, whose ancestors, as we know from "The Virginians," had been really distinguished.

Yet Pen held on his course in the new work he had found, and as a journalist and author he began to prosper. A novel which he wrote made his name known, and even the old major, scenting the possibility of fame for his nephew, began to revive his interests in the honour of the Pendennis family.

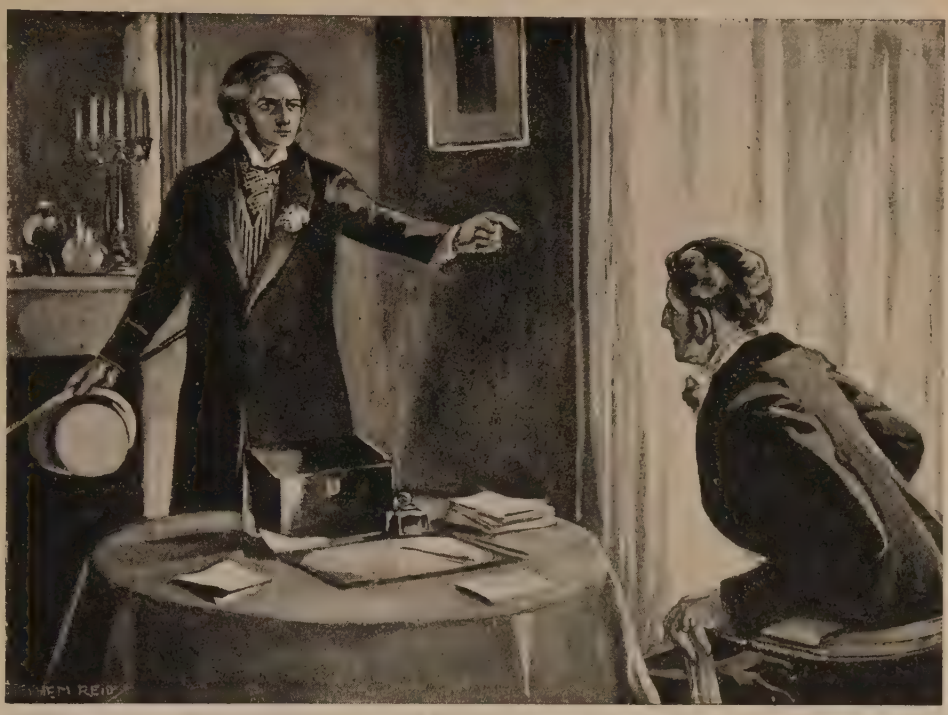
Just at this time Pendennis was stricken with fever, and was lying in a very serious condition at his rooms in the Temple, where poor little Fanny Bolton, the pretty daughter of a Temple porter, had come to nurse him. As soon as the news reached the major, he arrived with all haste at the bedside of the invalid, and there met Mrs. Pendennis and Laura, who behaved none too well to poor Fanny. George Warrington had gone away from town before Pen took ill, and was therefore absent when Major Pendennis and the others came to the rooms he shared with Arthur, but he returned to find the ladies in possession, and to discover in his heart a deep and true affection for the gentle Laura Bell.

PENDENNIS RECOVERS FROM THE FEVER AND LOSES HIS DEVOTED MOTHER

It was a wonder to him how Pendennis could ever have been insensible to the personal charms and beautiful character of that young lady, for whom he himself would willingly have given the whole world. And Laura on her part recognised at once the true gentlemanliness of Warrington, admiring the strength and independence of his character, and contrasting him with Pen and his dandyism, by no means favourably to poor Pen.

When Pen recovered from his fever, instead of striving to please his devoted mother, who had wept over him and borne with him so long, he acted with his old foolishness by declaring that Helen and Laura had done a great wrong to Fanny Bolton in turning her away from her nursing duties at his bedside, and that he meant to marry the porter's daughter. This was a return to the old stupid Pen, who had thought himself in love with the actress and ready to die for her. The major, of course, was frantic at this new whim, and Mrs. Pendennis was prostrated with grief and weakness; but not until George Warrington had told him of his own unhappy married life, and warned him against the danger of offending those who loved him best, did Pen regain his sober mind and go to his mother subdued. It was almost too late, for

PEN SURPRISES HIS UNCLE, THE MAJOR



Trading on a secret, Major Pendennis had got Sir Francis Clavering to resign his seat in parliament to Arthur Pendennis, and to promise a fortune to him if he married his stepdaughter. On getting to know the secret, Pendennis was indignant, and accused his uncle of base conduct. "I'll keep my promise to Miss Amory, sir," said Arthur; "but I will let Clavering off from that bargain that was made without my knowledge. I will take no money with Blanche but that which was originally settled upon her, and I will try to make her happy."

Mrs. Pendennis, who had been suffering in silence, died as she kissed her son, to whom her whole life had been devoted.

After the death of his mother, Arthur Pendennis was greatly changed, though he was still far from having reached true wisdom. As soon as the period of mourning was over, the major, more anxious than ever to maintain the "honour" of the Pendennises, set about discovering a rich wife for Pen, while Laura now went to live with Lady Rockminster, who had the good sense to understand and appreciate the sterling character of that noble girl.

In the course of his explorations among the rich and titled families of the day, old Major Pendennis found himself a guest at the town house of Sir Francis Clavering when an extraordinary scene took place. A strange person, in a tipsy state, forced himself into the room as dinner was in progress, and created a great disturbance. The stranger was known to some of the party as Colonel Altamount, an adventurer from India; but when his eye caught sight of Major Pendennis, he suddenly reeled towards the door, and was heard to mutter as he fled the place: "Captain Beak! Captain Beak! By Jingo!"

Sir Francis had shown the greatest fear and trembling when this unruly stranger appeared upon the scene, and it so happened that the old major recognised in a flash who this Colonel Altamount was. He had seen him before as one of a convict gang in New South Wales, and had good reason to believe he was none other than Amory, the scoundrel who had induced the present Lady Clavering to marry him when she was Miss Snell. Such was the fact, and Altamount had been preying upon the fears of Sir Francis by making that person supply him with money in order to keep quiet.

Both Sir Francis and Amory were men of low character, and the major, who was none too particular for a gentleman,

while caring for neither, determined to make some use of this knowledge he happened to possess. So he made a proposal to Sir Francis Clavering.

How Major Pendennis Tried to Profit by a Secret

"I want my nephew to enter public life," he said. "I want him to marry Miss Amory, and I want you to resign your seat in parliament in his favour. Nobody need know anything more about it." And thus we see that in his ambition to have a Pendennis eminent in the public life of his country he did not scruple at driving a bargain with a rascal in a corner.

"It will be easy enough to get rid of Amory," the old warrior thought to himself. "I could put my hand on witnesses who can swear to him, and who will prove that he killed one of his guards in New South Wales. Let my boy marry the heiress, and the rest will be easily done." The fact that his boy would thus become the husband of one whose father was a criminal did not seem to disturb the old schemer.

So it came about that in a few days more the major was able to apprise his nephew of the good fortune that had opened up for him. For it was before the days of honest voting for members of parliament, and people of wealth and position could do pretty much what they liked in obtaining admission to the House. Pen, of course, had no idea of the means whereby Sir Francis resigned his seat to him, and accepted it naturally as a reward for his own great abilities, which he esteemed, perhaps, more than did the world at large.

The Major Thinks His Little Scheme in Favour of Pen Is Succeeding

Pen did not take his uncle quite seriously when he suggested that Pen should become the husband of Miss Blanche Amory; but none the less he presently found himself a favoured guest of the Claverings, and the old days of exchanging poetry and romantic walks together had come back again; with this difference, however, that Arthur now had the encouragement of Lady Clavering and Sir Francis, and, better still, the rivalry of his old friend, Harry Foker, who, in his simple, stupid way, had fallen in love with Blanche.

Before long, indeed, the major had the delight of knowing that his nephew was engaged to Miss Amory, and the worldly old fellow rubbed his hands with pleasure as he watched the success of his plans. Unhappily for the major, he had reckoned without allowance for the erratic character of his nephew, in whom the impulse to do the straightforward and honourable action was often stronger than the readiness to take a mean course, though his intentions were sometimes better than his deeds.

Judge, then, the consternation of Major Pendennis when his nephew discovered, thanks to the eavesdropping of the major's valet, Morgan, who was base enough to betray the secrets of his master, the real reason for Sir Francis Clavering retiring from parliament in favour of Arthur Pendennis. The major had suffered many shocks and surprises due to the conduct of his nephew, but all were eclipsed by the shock he received when one day Pen burst into his room indignantly and rated him soundly for the mean compact he had made with the baronet.

Pendennis Refuses to Do a Base Thing and Ruins the Major's Plans

"Can't you see, sir," cried Arthur, "that rather than profit by this secret I would go and join my prospective father-in-law in the hulks? Can't you see that you have given me a felon's daughter for a wife, and doomed me to poverty and shame?"

"What, in the name of wonder, can you mean, sir?" asked the major, in a voice that betrayed his pain and alarm.

"I mean to say that there is a measure of baseness which I can't pass," Arthur answered. "I have no other words for it, and I am sorry if they hurt you. I have felt, for months past, that my conduct in this affair has been wicked, sordid, and worldly. I am rightly punished by the event, and having sold myself for money and a seat in parliament by losing both."

"How do you mean that you lose either?" shrieked the old gentleman. "Who is to take your fortune or your seat away from you? Clavering shall give it to you; you shall have every shilling of eighty thousand pounds."

"I'll keep my promise to Miss Amory, sir," said Arthur; "but I

will let Clavering off from that bargain that was made without my knowledge. I will take no money with Blanche but that which was originally settled upon her, and I will try to make her happy. You have done it. You have brought this upon me, sir. But you knew no better; and I forgive——"

It was in vain that the old man begged of Arthur, who was now feeling tremendously virtuous and noble, to take a more worldly view of the situation. He even went down on his knees to him, which was an extraordinary effort for the proud old major, but he was desperate at seeing his cherished scheme thus fail to carry. Arthur was determined to do the honourable thing at last, as indeed at all times his better nature prompted him to do. He would not accept the seat in parliament on the conditions his uncle had arranged, but he would stand by his promise to Miss Amory if she wished it.

IN THE CRISIS OF HIS LIFE PEN SEEKS ADVICE FROM LAURA

In this crisis of his life he fortunately followed the best promptings of his heart by going to Laura and seeking from her, whose gentle nature and calm, clear understanding could give him the counsel and comfort he most needed, advice as to what he ought to do. In the presence of Laura he discovered, at last, that he did not love Blanche.

He had known before that, when it would have suited his purpose to marry her, he had shut his eyes to her faults. Now that he contrasted her with the faithful, unfaltering Laura, to whom he owed so much, he saw only too clearly how vain and heartless was Amory's daughter and how her pretended romantic interests were a mere cloak for a shallow and selfish character.

Though Laura urged him to keep his word to Blanche and to lose no time in telling that young lady he was prepared to carry out his promise, we may have reason to think she was not without hope that Blanche herself might settle the matter differently, for Laura had now come back to something of her old girlish admiration for the splendid Pen, and who can tell what her hopes were at this crisis of his fortune?

Events soon happened that decided the lives of many with whose fortunes we have been concerned. The sudden death of the wealthy brewer, Foker, and young Harry falling heir to £15,000 a year, had a great effect upon the romantic heart of Miss Blanche Amory, who had no hesitation in giving Pendennis his dismissal when he placed himself in her hands. She was now to become the wife of the wealthy young brewer, and great were the preparations at Clavering Park for her wedding.

BLANCHE AMORY LOSES A HUSBAND BY ACTING DISHONESTLY

Just then Pendennis discovered that Blanche's disreputable father, the ex-convict, was hanging about the neighbourhood, evidently bent on blackmail. Telling her of this, he urged her to let her future husband into her secret; but, afraid of losing Harry Foker and his fortune, Blanche thought it better to keep the matter quiet until she had been married. Unfortunately for her, she could not keep her drunken parent quiet, and that person getting into a scrape, the news reached Foker, who, suspecting that Blanche had known the secret all along and kept it from him, flew into a righteous rage and betook himself far from Clavering Park.

"I would have taken you, whatever you were," he said, in his last meeting with Blanche. "I have loved you with all my heart and soul. But to think that you have been playing with me and cheating me!"

And so it happened that, instead of a brilliant and fashionable wedding at Clavering Church, a very simple ceremony was there observed one day, the bride and bridegroom being — Miss Laura Bell and Mr. Arthur Pendennis.

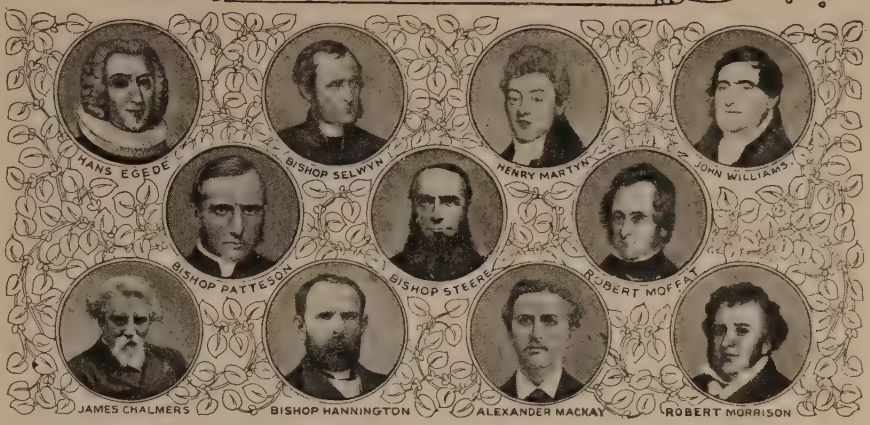
ARTHUR PENDENNIS AS A HUSBAND AND A FATHER

"And what sort of a husband would this Pendennis be?" many a reader will ask, doubting the happiness of such a marriage and the fortune of Laura. The querists, if they meet her, are referred to that lady herself, who, seeing his faults and wayward moods, seeing and owning that there are men better than he, loves him always with the most constant affection. His children or their mother have never heard a harsh word from him; and when his fits of moodiness and solitude are over, welcome him back with a never-failing regard and confidence.

The next Famous Books are on page 3603

WILLIAM CAREY WORKING AS A COBBLER

William Carey, "the father of modern missions," was a shoemaker by trade, but although poor, he educated himself, and became a Baptist minister. Even then he had to make and mend shoes for a living, as shown in this picture, for his congregation was composed of people so poor that they were able to give him only a weekly salary of $1.50. Carey not only inspired earnest Christian men with his own enthusiasm for teaching the Gospel to the heathen, but he won the esteem of the most distinguished men. After he became great and famous, he was once dining with the Governor-General of India, when a conceited youth at the table, pointing to Carey, said insolently to his neighbour: "This fellow was a common shoemaker, was he not?" Carey overheard the question, and he replied in the most gracious tone: "No, sir, not a shoemaker, only a poor cobbler."



SOME BRITISH MISSIONARIES

CONTINUED FROM 3338

There are many battles where no gun is fired, and real heroes who wear no red coats, for Peace, as Lord Tennyson sang, has her victories no less renowned than War. Among the world's great heroes stand out the names of many brave men and women who have gone out to teach the Bible to peoples of distant lands, and to carry the blessings of Christianity into uncivilised countries.

The missionary, who fulfils the command of Jesus to His disciples, "Go ye into all the world and preach the Gospel to every creature" cheerfully leaves his native land, his home and his friends, to spend his life where there is no civilisation, no comfort or safety, to dwell with dark-skinned men who worship ugly idols and are given to superstitious and cruel practices. The climate is often deadly, and his health breaks down where no doctor can advise or help; he has to endure hardships and sufferings, and the work of years seems sometimes almost hopeless until he gains the confidence of the natives.

To this consecrated service some of the best students from our colleges gladly give themselves, but we shall see how many of the best missionaries come of humble parents. They have very often been poor boys who have taught themselves, and have had to overcome many difficulties in their early days. They have made all the better missionaries for this, for in their work abroad they have been able to build their own houses and to teach their converts how to cultivate the land and to do other useful work. Of course, they have had to learn the language, and after that have often done good service in translating the Scriptures and many of our well-known hymns into the native tongues. The missionary is the pioneer—the first in the field; he makes it possible for trade to follow in his steps; for the natives will believe in the white men who come on business, because they respect and trust the one who has been their good friend and taught them to live rightly.

Let us look at some of these brave missionaries, whose names have become household words all over the world.

The Moravians are the pioneers of Protestant missionary enterprise, for although they are a very small body, they have had more than 2,000 missionaries in different parts of the world during the past 170 years. One of the most famous of these was Hans Egede, a young Danish minister of the

Moravian Brethren, who sailed from Bergen, in Norway, in the year 1718, to live among the Eskimos in the frozen North. He landed on the inhospitable shores of Greenland, and soon found how difficult it was to teach people so gloomy and superstitious, and for years he had to endure great hardships with little encouragement.

But he held on, and at one time, when the Eskimos were plague-smitten, he made his house their hospital, and tenderly nursed them, an act of mercy that won their gratitude. Egede was a man of simple faith, and with great humility did his work at a time when there were few missionaries anywhere, and none at all in the Arctic regions. As quite an aged man he returned home to Copenhagen, bringing his wife's remains for burial among her own people, and on November 7, 1758, he, too, entered into his rest.

DAVID BRAINERD, WHO LEFT ALL TO GO AND PREACH TO THE INDIANS

Another early missionary was David Brainerd, a Yale student who preached to the North American Indians in the colonies of New England. Brainerd was born so long ago as 1718, and his parents dying while he was yet a boy, he began life an orphan and with delicate health. As he grew up, he took to farming, and used to walk his fields bewailing his sins, for he was of a serious turn of mind, and full of self-condemnation. He was treated harshly at Yale College, although there is no name on its roll of greater honour, and he resolved to take the Gospel to all the Indians, who were then, of course, very much more numerous than they are now.

The hardships of travel, the sleeping in the open air, and the scanty food, soon began to tell upon his weak constitution. The language, too, was difficult, and he had to work very patiently at it, riding twenty miles through the dark forests to his instructor, and an offer of a comfortable pastorate among his own people was refused with self-denial. The story of his work among the Indians is one of truest heroism, for he had to work for many years without a glimpse of success. At last the revival came, thousands of the men of the forests came flocking to Brainerd, asking for prayer and counsel, and the heart of this humble servant of God was filled with gratitude. He was an old-fashioned saint, and his journals are a treasure of sweet musings that are read to-day.

CAREY THE COBBLER, WHO BECAME THE FATHER OF MODERN MISSIONS

But it is to William Carey, the learned cobbler who translated the Scriptures into Bengali, that is due the organisation of missionary work and enterprise in the churches of the English-speaking lands. When the popular idea, and even the belief of clergymen and ministers, was that if God wanted the heathen to be Christians He would convert them in some miraculous way Himself, Carey taught the great truth that it was the duty of Christian men in England and other lands where the Gospel was known and loved to carry out the Divine commission and go and preach to others.

Carey was a country boy, born in the village of Paulerspury, near Northampton, and his father, being parish clerk and schoolmaster, taught his son so well that his mother used to hear him counting in his sleep. William liked books, and was also fond of gardening. Picking up a little Greek and Latin while working as a shoemaker, he became a Baptist minister on $80 a year, and to add to his income still made and mended shoes, and did a little teaching.

One of the outstanding events in modern missionary history is the famous sermon preached by Carey at a meeting of ministers at Nottingham, in June, 1792, that led to the formation of the Baptist Missionary Society, the first organisation of its kind. The text was Isaiah liv. 2–3, and the preacher divided his sermon under two heads: "Expect great things from God," "Attempt great things for God," words that afterwards became the motto of the society.

A FAMOUS SERMON THAT STARTED THE GREAT WORK OF FOREIGN MISSIONS

The sermon created a profound impression, and the ministers decided there and then that by their next meeting, which was to be at Kettering, in the same year, a plan for the formation of a missionary society should be prepared, and this was done.

Then came his call to India as a missionary for Bengal, but he had difficulty in getting there because of the opposition of officials. Arrived at

Calcutta, Carey found himself and family homeless, friendless, and with scarcely any money. He tried to earn something by planting indigo, and at once gave himself up to the translation of the New Testament into Bengali, and became so proficient in that language that he was appointed one of the tutors in Fort William College. Through his efforts, joined with those of other missionaries, the government passed a law forbidding the burning of widows, and during his forty years of splendid Christian labour, he earned the position of distinction which he holds in the history of missionary enterprise. A domed tomb of solid stone, in the cemetery at Calcutta, marks his resting-place, the only inscription, at his own request, being his name and the date, with the words :

A wretched, poor, and helpless worm,
On Thy kind arms I fall.

Another noted missionary to the people of India was Henry Martyn, the Cambridge student, who travelled also in Persia. He was a Cornish boy of Truro, but was so weak in body that it seemed impossible that he would make any mark in the world, or live to find himself famous. But at St. John's College, Cambridge, he showed great aptitude for study, and it was during a vacation spent in Wales that his heart responded to the call to enter the mission field. While at the university, he became fast friends with another deeply religious student, Henry Kirke White, the Nottingham poet. After his father's death, Martyn had to make some provision for his sisters, so he went out to India as a chaplain under the Board of the East India Company. On the voyage out he preached to the crew, and spent much time in learning Hindustani. After a short stay at the Cape he reached Madras on April 22, 1806.

In his Indian work he met with great opposition, not so much from the natives as from the English officials, civil and military, but he persistently laboured on, translating the Bible with his faithful moonshee, or teacher, by his side. He also turned his eyes towards Persia, and with great pains and patient scholarship translated the New Testament into Persian, travelling in that country that he might get to know and thoroughly understand the people.

When Henry Martyn was a missionary in Persia, he attended one day the Vizier's levee, and a great discussion upon religion took place. At last Martyn exclaimed : "Jesus is the Son of God," and in a moment the place was in an uproar. It was with the greatest difficulty that he escaped, and that he was able to save the sheets on which were written his translation of the New Testament into Persian, that had cost him weeks of labour.

The Mohammedans, however, treated him and the Bible that had cost him so much labour to translate with scant respect. Finally, in a time of plague and fever, he passed away at Tokat, in October, 1812, writing : "O Lord, Thy will be done ! Living, dying, remember me ! " Lord Macaulay wrote his epitaph, and he is counted as one of the saints of the great missionary Calendar.

Robert Morrison, like Carey, was a shoemaker, and it was he who translated the Bible into Chinese. It often happens that a missionary has one part of the world in his mind, and yet goes to another. Livingstone's original intention was to go to China, but he went to Africa. So Morrison, who meant to follow Mungo Park to Timbuctoo, found his real sphere in China.

ROBERT MORRISON, WHO GAVE THE CHINESE PEOPLE THE BIBLE

As a youth he learnt his father's trade at Morpeth, but, before going abroad, he not only became a medical student at St. Bartholomew's Hospital, but found a young Chinaman in London, who taught him his language, and also showed him the sort of people to whom he was going to preach across the distant sea.

Arriving there, he let his hair grow, and wore a pigtail, and tried to live like a Chinaman until his health failed. His great work was the translation of the Bible; but he also gave the English Prayer-book to these people in their own tongue. But he was of great service to the English government in difficulties which arose with the Chinese, and at one time he was the secretary and interpreter of the consul. Before he died, in 1834, Morrison had finished his great dictionary of the Chinese language in six quarto volumes. To-day, all the Christian workers and their converts in China read the Bible he left behind.

John Williams, known everywhere as "the Martyr of Erromanga," was a young blacksmith. It was in City Road, London, that he swung the hammer at the forge. One Sunday night in 1814 a good old woman took him to the Moorfields Tabernacle, which led to his conversion, and to his future career as a missionary.

THE MARTYR OF ERROMANGA, WHO BUILT A HOUSE AND A SHIP WITHOUT TOOLS

He had little education, but was quick-witted, and impressed people with his honesty; he had also the knack of sticking to a thing, otherwise he would never have mastered the language of Tahiti, in the Society Islands, where he first went to preach the Gospel. He taught the natives some valuable lessons in handicraft, as they watched him build first his house, and afterwards his mission ship, the Messenger of Peace, with scarcely any tools. Perhaps the most difficult task was to make a pair of smith's bellows of goat skins, which the rats ate before morning.

In his boat, with mat sails, he made dangerous voyages from time to time, thousands of natives, who loved him, bidding him farewell with songs of sorrow. Six times Williams was nearly drowned, the sea waves dashing his vessel on the rocks. He was spared, however, to evangelise these South Sea Islands, and translated the New Testament into Raratongan. He went home, after many years, to plead the cause of these poor people in England. Returning on November 20, 1839, he landed with three companions on the shore at Erromanga. But the natives were hostile. A big savage struck Williams on the head, killing him, and a shower of arrows followed. In a few moments "the rippling water was red with the blood of the noblest man that has ever gone to those far-off isles of the South Sea, laden with blessings for the ignorant and outcast."

THE SAILOR WHO CARRIED THE GOSPEL TO THE END OF THE WORLD

When George III. was king, young Allen Gardiner, the middy who took Christianity to the wild Patagonians, had his first taste of the sea in war-time. Later, he bought a Bible at a second-hand shop, the reading of which changed his whole life, and he went out to Africa, after many dangerous adventures, preaching the Gospel to Dingan, the Zulu chief, over whom he exerted a good influence. After a time he sailed for Brazil—for South America was in great need of the Gospel—and earnestly worked among the Indians of Chili. Several times he nearly lost his life, but, nothing daunted, he resolved to visit Tierra del Fuego, and landed among the Patagonians with a few brave companions. He found these people very degraded, as Darwin had described them, but, with infinite patience and faith, Gardiner tried to bring light to their dark hearts. The closing days of this brave life were very pathetic. Landing at a certain point, he and his helpers found themselves without food. John Pearce, one of the number, crawled along the beach to say that Joseph Erwin had not spoken for two days, and when Gardiner, after a painful struggle,

THE PERILS OF THE MISSIONARY'S LIFE

Over and over again, Dr. Paton, the missionary to the New Hebrides, had to rush into the arms of some fierce savage who was about to kill him with his club, and cling round the man until his wrath abated.

Hans Egede, who carried the Gospel to the Eskimos, walked about Bergen for nearly four years before he could persuade anyone to convey him to Greenland. Here we see him gazing wistfully at a departing ship.

There is no sadder story in missionary history than that of Captain Allen Gardiner, who went to preach to the Patagonians. Landing on the inhospitable shores of Tierra del Fuego, he and his party found the natives hostile. Disease attacked the missionaries, their stores ran out, and they starved to death. Captain Gardiner himself died of exhaustion by the side of his boat, where his remains were found by those who came with relief.

The photographs on page 3483 are supplied by Fradelle, the London Missionary Society, the Church Missionary Society, and others.

reached the place, Erwin lay stiff and cold. Still another, John Bryant, was found cold and dead, with a smile upon his face, not far away.

THE BRAVE MEN WHO WAITED FOR THE HELP THAT NEVER CAME

Thus died they all, waiting for the help that never came. A month afterwards an English ship anchored by the still shores of Tierra del Fuego. All was silent in that dreary region. Along the beach the faithful martyrs lay. The captain cried like a child at the awful sight.

Gardiner had fallen down by the boat, too weak to climb back again, and scattered on the beach were the papers on which he had written in pencil the story of their sufferings. Written on the rocks were the words: "My soul, wait thou only upon God, for my expectation is from Him," painted there by Allen Gardiner as he lay, racked with pain, waiting for death.

Robert Moffat was a young gardener, and he became the pioneer missionary of South Africa. He was born at Ormiston, in East Lothian, on the shortest day of 1795, and his early days were divided between his Latin grammar, the blacksmith's hammer, and his violin. Afterwards he became an under-gardener in Cheshire. Seeing a placard of a missionary meeting, he attended, and this so influenced him that, after much prayer, he offered himself as a missionary.

He sailed for the Cape on September 18, 1816, and his first work, having learned Dutch, was with the farmers and the poor Hottentots, who were little better than their slaves. He visited Africander, "the Bonaparte of South Africa," and greatly influenced him for good, bringing him down to Cape Town, to the astonishment of the Dutch. He then founded the mission stations in Namaqualand, and worked among the Bechuanas at Lattakoo.

HOW ROBERT MOFFAT WENT TO LONDON AND PREACHED IN THE ABBEY

He translated part of the New Testament into the Bechuana language, and returning for a visit to England in 1840, he was able to translate some of the Old Testament, including the Psalms. In the year 1873, as a tall, white-bearded old man, he was invited by Dean Stanley to speak at Westminster Abbey, and a great crowd listened with reverence to his thrilling story of work among the natives of South Africa.

His later work was at Kuruman, where his daughter married Livingstone, and at last, with his faithful wife, he returned home, and died full of years and public honours in August, 1883, the veteran apostle of the mission field.

We read about David Livingstone, the Scottish weaver boy, whose heart was buried in Africa, on page **282.** We are not likely to forget his honoured name, and on the floor of Westminster Abbey, where the sunshine falls through the stained windows, we find his grave; but his heart is buried in the land he loved so well.

We read of Bishop Crowther, the black slave boy who became a bishop, on page 2914. of this book. There have been few histories of the mission field equal in interest to the life of this black bishop. He was a marvellous example of what a negro may be and do in the service of God and man.

A SCHOOL FRIEND OF MR. GLADSTONE WHO BECAME A MISSIONARY BISHOP

Bishop Selwyn, the athletic student who worked so hard in New Zealand, was born in an old-fashioned rectory at Hampstead on April 5, 1809. After some preparatory schooling at Ealing, the boy, who, one day, was to be a bishop, was sent to Eton, where he made friends with many who, like himself, became in later years great men. His school chum was Mr. Gladstone, and that friendship remained till the very last. Here, and afterwards at the university, Selwyn was first in all the sports. It was said of his good nature that "he always took the labouring oar in everything." He could dive like none other, and in the grounds was "Selwyn's bush," over which he leapt and turned a somersault into the river on the other side. In due time he became a curate at Windsor, and was consecrated Bishop of New Zealand on October 17, 1841.

The Maoris were not yet settled to English rule, and in the conflicts that often occurred the personal influence of Bishop Selwyn counted for much. The Maoris trusted him, and he was peacemaker often at great risk to himself. "I am your mediator," he used to say to them. "I have eaten your food, slept in your houses, talked with you,

prayed with you; let us dwell together with one faith, one love, and one Lord." He travelled through the country, and once, after visiting an island, he brought two little girls back with him, arrayed in garments made by himself out of an old quilt.

BISHOP SELWYN'S DEATH, AND HIS INFLUENCE OVER AN ETON BOY

Afterwards he came home, and became Bishop of Lichfield, where he worked hard, and at last, on April 11, 1878, lay a-dying. Calling some children to his bedside, he said softly: "I wish you were little robins so that you might sit on my finger." Soon afterwards he whispered in the Maori language: "It is light," and, smiling, passed to the land of everlasting day.

Bishop Patteson, the Eton boy, who was martyred in Melanesia, was a Devonshire lad, fond of books and of a good game of cricket. Young Patteson went from Ottery St. Mary to Balliol College, Oxford, where he studied hard, and was played as captain of the eleven. A long holiday, spent in travelling on the Continent, opened his mind, but it was hearing a sermon by Bishop Selwyn, in the parish church of New Windsor, that inspired him with the desire to be a missionary; and eventually, as a young clergyman, the bishop took him with him to work among the islands of Melanesia. Here for years he laboured, preaching the Gospel and specially caring for the native lads, whom he loved and trained as teachers, on Norfolk Island. A man of great courage, Patteson used to visit the islands, sometimes swimming through the surf, often at great personal risk.

HOW THE CANNIBALS OF MELANESIA KILLED THEIR BEST FRIEND

He tried to protect the natives from being kidnapped by white men, but one day, when he had landed alone among a crowd of infuriated cannibals, he was killed, and his body, with five wounds and five sprays of palms upon his breast, was floated out to the ship. A beautifully carved pulpit to his memory stands in Exeter Cathedral.

Another bishop, Dr. Steere, known as the fishermen's parson, went to Zanzibar. For many years the slave-market of East Africa was at Zanzibar, and Bishop Tozer had striven to educate the poor boys who came into his hands from the sultan. Now, upon this spot where miserable people were sold into slavery, a handsome church, with a high steeple, stands, the cathedral of Zanzibar, which was built by Bishop Steere. He succeeded to the bishopric when Bishop Tozer resigned, and had come out from England, where he had worked among the poor. He was rector of Little Steeping, near Skegness, and the fishermen of his parish called him "a downright shirt-sleeve man and a real Bible parson."

He first went to Zanzibar in 1862, and after translating part of the Scriptures into Swahili, returned home, and returned again as Bishop of Central Africa, having been consecrated in Westminster Abbey, in 1874. He spoke many languages—French, German, Portuguese, Italian, Spanish, besides the native dialects. On August 28, 1882, he was buried in his cathedral church at Zanzibar.

THE BRAVE BISHOP HANNINGTON, WHO DIED A MARTYR IN UGANDA

Bishop Hannington, the merry schoolboy, who died for the faith in Africa, was such a cheerful youth that they called him "Mad Jim" at school, and all through his life this happy-heartedness never left him. He had a pleasant curacy in Devonshire, and then went to Hurstpierpoint, in Sussex, where, though married and settled with his family around him, the call of God came to Hannington to go to Africa as a missionary. He landed at Zanzibar in 1882, and travelled up the country, through dense forests, perils by robbers and wild animals, and eventually reached Uyui, near to the spot where Stanley had said good-bye to Livingstone some years before. Whenever he met the chiefs he preached to them of Christ; and after reaching the Victoria Nyanza Lake he turned homewards, and was in England again after a year's absence. But, in 1884, he went out again to Equatorial Africa, laboured at Uganda, was captured by a treacherous chief, and, after declaring to the natives that he was ready to die for Uganda, was shot with his own gun.

Another devoted missionary who died at the post of duty in Uganda was a young engineer named Alexander Mackay. He was never anything but plain Mr. Mackay, a young man with an apostolic spirit and a large heart of grace and faith. Born a Scotsman, in

a Free Church manse, he studied hard for his profession, both in Edinburgh and Berlin, reading also good books, but never neglecting the Bible his mother gave him when he left home.

THE ENGINEER WHO BECAME A MISSIONARY AND WOULD NOT COME HOME

He was always a strong character, and when he was in Uganda, faced by worries and persecutions enough to daunt anybody, his spirit was undismayed. He passed through the terrible experiences of those early years when the country was stirred by efforts of rival British and French trading companies to gain control. Once his life was saved by Catholic missionaries.

Mackay told his wonderful story in his letters home, never making much of his part of it, though he was really the hero of many a struggle. He wrote articles trying to open the eyes of his friends in England to the real needs and troubles of Africa, all the while he was working away at practical things, with his heart full of the love of God. Mackay always thought of himself last. In one of his letters he said: "But what is this you write—'Come home'? Surely, now, in our terrible dearth of workers, it is not the time for any of us to desert his post." Mackay died of fever on the morning of February 8, 1890, still young in years, but in Christian service almost a veteran.

James Chalmers is often spoken of as Tamate, the name by which he was known in New Guinea. When he first landed, a native called out: "What fellow name belong you?" "Chalmers," was the answer. "Tamate, Tamate," the native shouted as he ran back to his companions. This is how he came to go to New Guinea. His father, who gave him sixpence for learning the 23rd Psalm, was a stonemason in Argyllshire, and sent the boy to Sunday-school, where he heard from his teachers of the need of help in Fiji.

HOW JAMES CHALMERS WAS KILLED WHILE TRYING TO MAKE PEACE

Coming home he determined to answer the appeal. From that time his face was turned towards the mission field. After going to Cheshunt College he was ordained at East Finchley, and in due time started for Samoa and Raratonga, in the Pacific. He took with him a good, brave wife, who shared his trials. His work among the cannibals in these islands was rendered more difficult by the strong drink they took, that Europeans brought to them. But he loved the savages, though he often stood in great peril when dealing with strange chiefs, who tried to rob him and threatened his life with their clubs and spears. But Tamate, unarmed, defied them, and lived to be a white-haired old man. Then, one day, hearing of trouble among the natives on Goaribari Island, he went up the Fly River, and, in his fearless way, walked among them, seeking to make them quiet and peaceful; but they knocked him down and speared him, and afterwards feasted upon his body.

John G. Paton, a Dumfries laddie, became the Apostle of the New Hebrides. He won this title of honour by living among the natives of these islands until his hair was white, gaining their love by his patience and helpfulness, and teaching them how the grace of God could make the very worst of men good.

THE RAIN THAT CAME UP FROM A HOLE IN THE EARTH

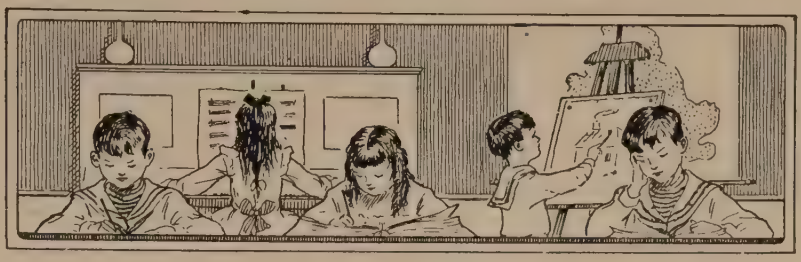
He left Glasgow as a young man, and the chief of the Island of Tanna told him the fever would soon kill him; but his life was mercifully spared not only from disease, but from the clubs of these cannibals; for he was not afraid to stand between quarrelling tribes; and on one occasion his house, with all his books and medicines, was burnt to the ground.

Paton believed in prayer, and one of the wonderful stories he used to tell was how, when all the natives were suffering from drought, he dug a well in sight of them all, asking God to send water. The people had never heard of such a thing, and one chief said to Paton:

"No, missi; you will never see rain coming up from the earth on this island. We wonder what is to be the end of this mad work of yours. We expect daily, if you reach water, to see you drop through into the sea, and the sharks will eat you! That will be the end; death to you, and danger to us all."

When at last the water came in refreshing springs, the people brought their idols and burned them, promising to worship only the one true God.

The next Men and Women begin on 3567.



READING

THE DIFFERENT KINDS OF MOODS

CONTINUED FROM 3428

Do you ever watch the birds flying along so gracefully and easily, the swallows skimming the surface of a lake, or the crow flip-flapping far above your head? Have you ever seen a hawk hovering ever so high up—how he moves his wings just once or twice, and then glides on a long way with his wings quite still and motionless? If so, I am sure you must have envied them, and said, "Oh, it *would* be nice to fly!" But if one of the birds were to speak to you, he would not say that, but he would say, "Yes, I fly very nicely, do I not?" And then he would look quite conceited, and think himself ever so much cleverer than you, because he can fly right over the church steeple while you have to walk or run on the ground.

Now, what is the difference between those two sentences: "Oh, it *would* be nice to fly!" and "I fly very nicely"? I think you can see at once (that is, if you remember our last talk) that the word "fly" in the second sentence is in the Indicative Mood, for it simply states a fact. You will also see that it has the pronoun "I" joined with it, making "I fly."

Now, in the first of those two sentences there is no pronoun with the word "fly"; you read only "to fly," not "I fly," or "He flies," or "The bird flies." So we see that some parts of a verb are used with nouns or pronouns, while other parts are used without them (generally with the word *to* in front of them). All the parts that have nouns or pronouns with them (as "I walk," "Fire burns," "Go ye") are said to be Finite (that is, limited) Moods, while the other parts are said to be not-finite or Infinite, because they are not limited by any noun or pronoun. The Finite Moods are the Indicative Mood, the Imperative Mood, and one that you have not learnt, the Subjunctive Mood. All the other parts of the verb are Infinite.

This is rather hard, I know; but perhaps these examples will make it easier. The words printed in capital letters are Infinite, or in the Infinitive Mood, as it is sometimes called:

TO WALK is easier than TO RUN.

David used TO KEEP his father's sheep.

Baby wants TO PLAY with my top.

I can JUMP over this gate.

Perhaps some of you will say, "In this last sentence there is a pronoun I with the verb jump, and therefore it is a finite mood." But the pronoun does not go with "jump," but with "can," and you will see it quite clearly if we write "I am able TO JUMP over this gate" instead. Nearly all parts of a verb with TO in front of them are Infinitive.

You will often hear people say, "I will try and do it," but that is not right. We ought to say, "I will try TO DO it," for DO is really in the infinitive mood after TRY, and the second sentence shows it clearly.

Now, can you pick out the Indicative and Infinitive Moods in these funny verses? If you have carefully read what has gone before it should be easy.

I like to walk along the street,
But you prefer to run;
I always ask for cake to eat,
While you select a bun.

And when I stand upon my head
I see things downside up:
The bedclothes underneath the bed,
The saucer on the cup

But when upon your head you stand
You see things upside down;
The sea is washed by solid land,
The river's on the town.

We can't agree, 'tis sad to say,
We seem to differ quite,
For you prefer to sleep by day,
And I to wake by night.

WRITING

TOM AND NORA USE SMALLER CRUTCHES

"You have got on so well with words and numbers that to-day we are going to do something new—something you will like, I know, because if it is well done the two letters to Cousin Jack will be written next week," Tom and Nora were told by their mother, when next they came with their books and pens for their writing lesson.

"All this while," she said, "we have been using crutches, or, as Tom calls them, railway lines; but now is the time to see if we can do with closer railway lines. We shall have to be very careful to keep the letters the same size, for it would be dreadful to have to take to wide lines again when we can walk nicely with narrow ones if we try.

"So now we will just rule lines close together, and write little sentences with smaller letters. You will be able to write them easily if you are quite careful about the size of the letters."

This was the first sentence which was written for Tom and Nora to copy:

The river flows very quickly by

Many hands make light work

"In these two sentences we find just what we want to bring to mind: the proper height of the small letters. The loops below the line will not trouble us. They are all equal; it is only p that has a short tail. We can remember that by thinking p begins puppy, for we expect a puppy to have a shorter tail than a grown-up dog."

"Mother, will you tell us how we can remember the tails of capital letters?" asked Nora presently.

"Let us look at them," was the reply.

Nora turned up her pages of capitals, but she could only find Y, Z and G with tails, and as they were all alike and just the same length as those of the small letters, Nora thought she could not forget them.

Kind words are like pearls

Nora read the words, and, while dipping her pen in the ink, thought it would be nice to have pearls of that kind to give away.

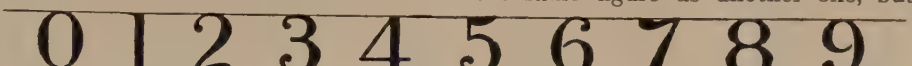
Tom remembered when he came to l and k that their loops were a little longer than the long stroke of d, but that p was short above and below the line. His mother pointed out that none of the small letters had loops so high as the capital letters.

"We will see how you remember the height of these letters," she said, as she wrote for them two more sentences.

"They can't be vain like the peacocks, Nora," said Tom; "you see, they are all alike."

"A useful thing to be able to do," said their mother, "is to write figures like printed ones, because they can be made so clean, and we can

write them on parcels, tickets, or the covers of books. We will take the figures 0 to 9, because, as you know, all numbers are made from these."



"The figures are very upright," said Nora.

"Yes," replied her mother; "broad and upright, and very plain and nice to read. If we look at them carefully, we can easily see how they are made. Four is made with three straight strokes. See how the down-stroke of seven gets thicker at the bottom and how eight is in two halves. Which do you think is the same figure as another one, but turned upside down? Like kitty, it looks as though it tried to run after its own tail."

"It must be six," exclaimed Nora. "Why, yes, mother; if it runs round after its tail, it does make nine! See, Tom! Isn't it so?"

HOW TO DO "LONG DIVISION"

We have now to consider division by numbers which are greater than 12, and which cannot be split into factors as small as 12. Let us first try to divide 3266 things into 23 equal groups.

First, the given number contains 3 thousands. But there are to be 23 groups, so it is clear that we cannot put a thousand into each group. But 3 thousands make 30 hundreds, and these, with the 2 hundreds in the given number, make 32 hundreds. Evidently this is sufficient to enable us to put 1 hundred into each group, because that requires 23 hundreds only. We should have 9 of the hundreds left, and these are not enough to give us a second hundred for each group. This is the end of the first stage of our work.

Next, the 9 hundreds which were left make 90 tens. The given number contains 6 other tens, so that we now have 96 tens. We have to find how many tens we shall be able to put into each of the 23 groups, and yet not use more than 96 tens. A little later we shall learn how to find this fairly easily; but for the present we must be content to see that to put *one* ten into each group uses 23 tens; to put 2 tens into each uses 2 times 23, or 46 tens; to put 3 tens into each uses 3 times 23, or 69 tens; to put 4 tens uses 4 times 23, or 92 tens. There are now only 4 tens left. Thus, we are able to put 4 tens into each of the 23 groups. This is the end of the second stage of our work.

Finally, we have 4 tens, which make 40 units, and the 6 units of the given number, making 46 units in all. By counting a unit into each of the 23 groups, in the same way that we counted the tens, we see that we are able to put 2 units into each group. This is the end of the division.

Altogether, in each group we have put 1 hundred, 4 tens, and 2 units. That is, each group contains 142 of the given things; so that 3266 things, when divided into 23 equal groups, give 142 things for each group.

Now let us see how this process can be expressed in writing. It is usual to place the dividend between a pair of brackets, turned outwards. The divisor is written in front of the first bracket.

```
23)3266(100 +40 +2
  2300
  ----
   966
   920
   ---
    46
    46
    --
```

As we have already seen, out of the 32 hundreds we can place *one* hundred in each of the 23 groups. We therefore write 100 to the right of the second bracket. Then we multiply the divisor, 23, by this 100, which tells us that we are using 2300 in our 23 groups. We write this 2300 under the dividend, 3266, and subtract. This shows that we have now 966 of the original things left. The second stage of our previous work showed us that, of these 96 tens, we can use 92 tens in putting 4 of them into each group. Therefore, we write 4 tens, or 40, in our answer; multiply 23 by 40, and after writing the result, 920, under the 966, we again subtract, and find we have now 46 things left.

The third stage of our work showed us we could, out of these 46 units, put 2 units into each of the 23 groups. So we now write 2 units in our answer, multiply 23 by 2, giving 46 units. The subtraction shows that we have now nothing left, and therefore we have used the whole 3266 things, and have put into each group 100 things, and 40 things, and 2 things—that is, 142 things altogether.

Now that we understand the principle of the process, we can see that we need not write down as many figures as we have been doing.

First, the *position* of the 2 and the 3 in our first multiplication, 2300, shows that 23 must stand for 23 *hundreds*. Therefore, it is unnecessary to write the 00. In the same way, we need not write the 0 at the end of 920, since the position of the figures again shows their value. Next, the three stages of our work have consisted of dividing, first the hundreds, then the tens, then the units. Thus, at the second stage, say, we are not dealing with *units*, so we need not write down the unit's figure, 6, of the number of things, 966, which we have left at that stage. We "bring down" the figure from the dividend as we require it.

Finally, the "answer" need not be written as we wrote it at first, 100 +40 +2, for when we divide the hundreds, and see that we can put 1 hundred into each group first, we know that we shall then proceed to tens, and, last of all, to units. That is, we know that there will be three things to put in the "answer," so that instead of 100 we write 1 only, and the two figures which have to follow will make this 1 mean 1 hundred. The work will therefore be like this:

```
23)3266(142
  23
  —
  96
  92
  —
   46
   46
   ==
```

(1) Take as many figures of the dividend as will make a larger number than the divisor. In this case, two figures, 32, make a larger number than 23. To find what figure goes in the answer, use only the first figure of each of these numbers. Say, How many 2's in 3? Evidently, 1. Put 1 in the answer. Multiply 23 by 1. Write under 32, and subtract. The remainder is 9; really 9 hundreds, but we need not trouble about that.

(2) "Bring down" the next figure, 6, from the dividend, writing it after the remainder, 9. We have now to divide 23 into 96. Say, as before, How many 2's in 9? There are 4. Put 4 in the answer, after the 1 which is already there. Multiply 23 by 4, and write the result, 92, under the 96. Subtract. The remainder is 4.

(3) Bring down the next figure, 6, from the dividend. This gives 46. Say, 2 into 4 goes 2. Put 2 in the answer. Multiply 23 by 2. Write the result, 46, under the other 46. Subtract. There is no remainder. We have no more figures to "bring down," so the division is finished.

Answers to Examples on page **3426**:
1. 26347. **2**. 185786. **3**. 102051
4. 820. **5**. 22707. **6**. 126.

MUSIC

A FIRST LITTLE EXERCISE

THERE is so much to learn in music that no one book in the world can tell it all; and now that we are getting on so well we must buy a little book that will make our learning easier, because it gives us a great deal that there is not room for in an encyclopædia. There are many books that will do this, of course, but the one we shall refer to is called "L'Indispensable," published by Messrs. Ashdown, Hanover Square, London; Robin Ellis, New York.

It was written by Aloys Schmitt, who is well acquainted with the little fairies and has done his best to help us get our fingers ready to do the fairies' bidding.

We begin by looking very carefully at Exercise I., and we will call it "The Fairies' Drill." They want all our fingers to be quite free, and equally strong—in fact, each must be as the other. But first of all we must understand all about this little exercise.

We notice the little brace {, which tells us that the fairies in the treble and the fairies in the bass are going to sing together, so when we have found out what each hand must do, we shall

play them at the same time. We see the little figure known to us as Treble Clef directing us to the notes on the treble staff, and we see the little figure which we know to be the Bass Clef showing us our way to the notes on the bass staff.

Now we come to something we have not seen before, the little sign written like this

It is really a broken circle, but before we can quite tell what the fairies mean by this little C we must find out something else. If we look at the exercise we notice little lines going straight down through the treble and bass staves.

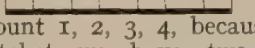
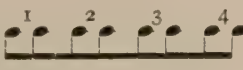
It is just as if the fairies wanted little fields of sound, each field to be the same size, and each one within its own little railing. Yes, it is quite true that all music to-day is written in this way. The little lines have a name all their own; they are called *bar-lines*, and the space between the bar-lines is called a *bar*. Here is a picture of four bars—four of the fairies' little fields.

These bar-lines help us very much, because when we are first reading one of the fairies' letters we know we are to make the first note after the bar-line—that is, the first note in each bar—a little louder than the other notes. We shall have to press that particular note a little more, and the fairies call this pressure *accent*. We must take still another look at this first little exercise, and we shall find something that looks like a double line

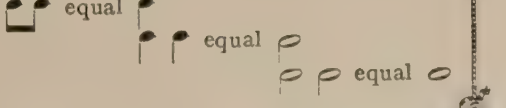
This is to tell us that the fairies have come to the end of this first little bit of drill, and they call it a *double bar*. But what has all this to do with the little sign we were talking about, C? Just this. We said the fairy fields of sound have to be the same size. Sometimes the fairies have a game of play, and move their railings, or bar-lines, but then they tell us they intend to do so. Sometimes for quite a long time you will find their railings are placed at equal distances, and each little field is the same size as the other. The fairies are so thoughtful that they have signs to guide us in every direction, so that we may always know what they want. They show us the size of each little bar by signs or figures placed at the beginning of their letters. These letters we call *pieces* or *exercises*. So our little C is placed at the very beginning of this particular exercise to tell us how many we must count to carry us through the two little bars we are going to play. It is called a *time signature*—that is, the sign that will tell us the time we are to keep.

C is called *common time*, the time that is used the most in music, and it means that each bar contains the value of four crotchets. Now, if we remember the game we played with King Semibreve, the Lords Minim, the Masters Crotchet, and the little quavers, we shall be able to think and say quite quickly: One semibreve is worth four crotchets. So in this little exercise each bar is big enough for King Semibreve 𝅝. Two minims are equal to one semibreve—𝅗𝅥 𝅗𝅥 equal 𝅝. So, if King Semibreve wishes to rest, each of these bars can take two minims.

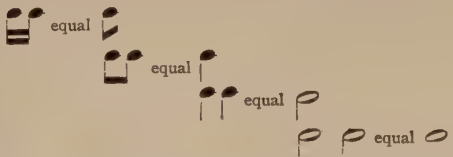
Four crotchets take up the same time as two minims or one semibreve—♩ ♩ ♩ ♩ equal 𝅗𝅥 𝅗𝅥 equal 𝅝; therefore, in these two little bars, we may, and do, count 1, 2, 3, 4.

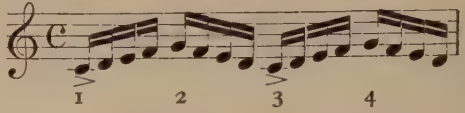
It is quite possible for four little crotchets to give way to eight little quavers,  , and still we count 1, 2, 3, 4, because for every crotchet we have two little quavers. So they have to trot a little quicker, 

, and we see that



If we look at our exercise again, we see sixteen little black notes, and each note has a double tail . This tells us that they are even smaller and less important than the little quavers. The fairies whisper, "These little notes with a double tail are *semi-quavers*, and it takes two semi-quavers to represent one quaver." Semi means half, and these wee notes are just nothing more or less than half-quavers. So as our bar can take eight quavers, if the quavers take a holiday (as they evidently have done in this little exercise), and tell the little semi-quavers to take their place, we find ourselves with sixteen little semi-quavers, and we can make our little list of notes still longer :



So we see that we want four little semi-quavers to make one crotchet. There are four tiny groups. Each tiny group must represent a crotchet; so as semi-quavers are on duty, each little group contains four semi-quavers, because equal , and this is how we count :

The fairies want us to press the very first note of each bar, so that those who hear us may know it is the beginning of the bar; and when we reach group 3 we give another gentle little pressure, not so much as on the first note of all, but just enough to show us we have got half-way through the fairies' field—that is, that we have reached the half of the bar, and anyone who hears us will know we are playing in common time, or four crotchets in the bar.

Next time we are going to think of the notes, and how to make our fairies give us the lovely tone we want so much to hear.

DRAWING

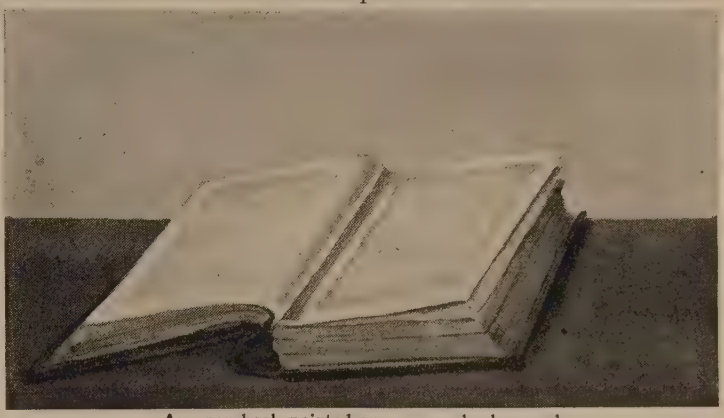
THE RIGHT WAY TO USE COLOUR

THERE was once a little girl who was very fond of drawing. She thought she would like to paint a sketch from Nature; so she got her sketch-book, paint-box, and camp-stool, and started out, very proud of herself, and quite sure she would succeed. She had not been taught anything about sketching, and did not know whether one subject was more difficult than another, so she chose a very pretty view, a blue sky, green fields, and waving trees. She painted very happily for a long time, then suddenly she felt her drawing was all wrong. She looked at the lovely country, and at her own drawing, then she tore it up. She went home very sad, and cried a little in her own room; but she was too proud to tell anyone, or to ask for help, because she was quite sure now that she would never be able to paint.

A green leaf and its shadow

Not long after this someone took her to a picture gallery, and she looked carefully at the pictures of landscapes painted by a man named Turner; and then suddenly her eyes were opened as if a fairy's wand had touched them. The trees looked all right in these pictures, yet she had always thought their trunks were black or grey; here they were all colours—green, yellow, red, even blue!

When she went into the country again she saw all these colours for herself, and found that green leaves sometimes looked white, or blue, or grey, according to the light or shade in which they were. And so she went to all the picture exhibitions she could find, and learned things that helped her wonderfully, and which she never forgot. The artists had shown her how to see things that they had learned to see. But it was rather silly of the girl not to ask older people for help as well, wasn't it? Perhaps she was wiser about this, too, as she grew older.



An open book painted on a green background

Shall we try to paint something now, and see what some of the difficulties are that we have to be helped over?

We will choose one of the things we have learned how to draw, and make the best drawing we can first, as no painting looks well unless the drawing is good too.

Shall we choose an open book—a bright brown one, and put it on a green background? We must draw it first carefully, taking care not to spoil the surface of the paper with rubbing out.

We know how to put on a flat wash, so we will do that first. If it is not quite smooth, it may be because we have not had enough practice. But perhaps the paper is not right. Water-colour paper, stretched as we know how to do it, is best; or we can use water-colour blocks. Perhaps the brush is not a good one; but good brushes and paints and paper will not make artists, though they help them very much. The best brushes are sable brushes, which want careful choosing. They are expensive, but they are nice for birthday presents, and we know by this time how to choose a brush, as painting soon teaches us the faults in our tools.

Then, perhaps, the colours seem chalky, especially ultramarine or cobalt, and leave little dark spots on the surface, however careful we are. Cobalt is very expensive if we buy it good; but it is better to have a very few colours, and to have the best, than to have a great many mixed paints of which we hardly use any, and now that we can paint a little it is worth while to get good paints. The best plan is to buy an empty enamelled tin box, and get the colours gradually as we can.

We must have light red and Indian red and rose madder. This last is better than crimson lake or carmine. We shall also want Vandyke brown and sepia, indigo, cobalt or ultramarine, yellow ochre, and lemon yellow. Everybody has a different list of colours that they like best, and it is nice to know the paints so well that we can make a selection that will be useful when we have spent still more time on painting.

We learned how to put one colour over another without spoiling it when we did the washes, so now we can put the shadow of the book over the background, softening the edges so that there is no hard line; and we can put the shadow on the white book and soften the edges in the same way. We must not put one colour on another till the underneath one is dry, and we must not work with the colour too dry in our brushes, or we shall get hard lines and edges where we do not want them.

Then we might try a leaf, putting the shadow it casts on the background before we colour the leaf itself. Shadows are made up of different colours; for instance, where the light shines through the leaf we see a greenish or yellowish tinge. If we try putting different coloured flowers on white paper, we shall see how different the colours even of shadows can be.

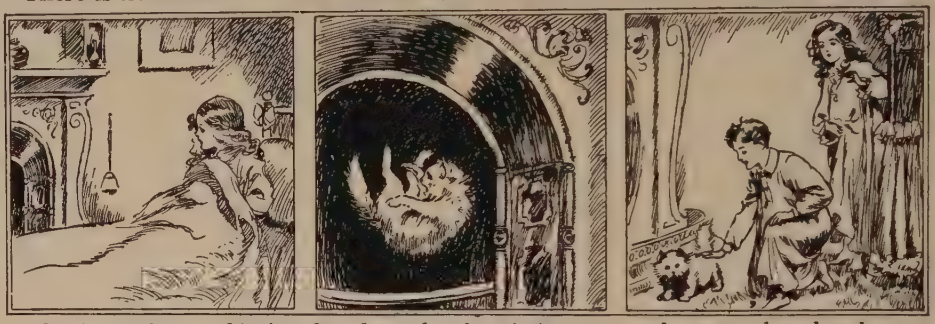
LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Il est huit heures. La chambre à coucher est noire. Nous sommes presque endormis.
It is eight hours. The room to to sleep is black. We are nearly asleep.
It is eight o'clock. The bedroom is dark. We are almost asleep.

Tout à coup il y a un bruit dans la cheminée. "Qui est là?" dis-je.
All at blow it there has a noise in the chimney. "Who is there?" say I.
Suddenly there is a noise in the chimney. "Who is that?" I say.

On ne répond pas. La bonne entre; elle frotte une allumette et allume le gaz.
One (not) responds not. The nurse enters; she rubs a match and lights the gas.
There is no answer. Nurse comes in; she strikes a match, and lights the gas.



Quelque chose dégringole dans la cheminée et tombe sur le plancher.
Some thing tumbles down in the chimney and falls upon the floor.
Something slides down the chimney and falls on the floor.

Jeannette crie. La bonne dit: "Chut! Vous allez réveiller Bébé."
Jenny cries. The nurse says: "Hush! You go to awaken Baby."
Jenny screams. Nurse says: "Hush! You will waken Baby."

"C'est un petit chat," dis-je. "Il a peur. Puis-je lui donner du lait?"
"This is a little cat," say I. "He has fear. May I to him to give some milk?"
"It is a kitten," I say. "He is frightened. May I give him some milk?"

La bonne tire la sonnette et la servante apporte du lait dans une soucoupe.
The nurse pulls the bell and the servant brings some milk in a saucer.
Nurse rings the bell, and the maid brings some milk in a saucer.

Bébé s'éveille et crie: "Joli minet! Puis-je l'avoir dans mon lit?"
Baby herself awakes and cries: "Pretty pussy! May I him to have in my bed?"
Baby wakes up and cries: "Pretty pussy! May I have him in my bed?"
Mais la bonne dit: "Nous le mettrons dans cette corbeille près du feu."
But the nurse says: "We him will put in this basket near of the fire."
But Nurse says: "We will put him in this basket near the fire."
Le matin il est parti. Peut-être les fées l'ont emporté.
The morning he is departed. Perhaps the fairies him have carried away.
In the morning he has gone. Perhaps the fairies have taken him away.

THE NEXT SCHOOL LESSONS BEGIN ON PAGE 3707

THUMBELINE FLOATED DOWN THE STREAM

Thumbeline became happy again, for everything she passed was so lovely in the sunshine, and the birds on the branches sang to her as she floated by with her pretty butterfly tied to the leaf of the water-lily with her sash.

LITTLE TINY THUMBELINE

CONTINUED FROM 3314

ONCE upon a time there lived a young wife who longed to possess a little child, so she went to a fairy and said to her: "I wish very much to have a child, a little tiny child. Will you give me one, dear fairy?"

"With all my heart," replied the fairy. "Sow this barleycorn in a flowerpot, and then see what will happen."

"Thank you, thank you!" cried the woman, giving the fairy a silver coin. Then home she went, and planted the barleycorn, and immediately there shot up a large flower like a tulip, but with the petals tightly closed like a bud.

"What a lovely flower!" said she, and kissed it. The bud opened at once with a loud voice, and there, in the centre of the flower, sat a little tiny girl about an inch high, scarcely bigger than her thumb. So she called her Thumbeline, and put her to bed in a walnut-shell, with violet-leaves for her mattress and a rose-leaf for a quilt. During the day she told Thumbeline stories, and taught her to sing, as she played on the table beside her.

But one night a great, wet, ugly toad came and stole away the cradle with little Thumbeline asleep in it, and carried it off to her home in the muddy bank of the brook that flowed past the end of the garden.

"This is just the wife for my son," thought she. But when her ugly son saw her, all he could say was "Croak, croak, croak!"

"Don't make so much noise, or you'll wake her," said the old Mother Toad. "She may easily escape, for she is as light as a feather. We must take her out and place her on one of the large water-lily leaves in the middle of the brook, while I prepare our house for you both."

This they did, and when poor little Thumbeline awoke and found herself in the middle of the stream, she cried most bitterly.

As soon as old Mother Toad had decorated her home with bulrushes and yellow buttercups, she and her hideous son swam out to the leaf to fetch the cradle so as to place it in their new home before taking the little maid herself there.

Old Mother Toad bowed low in the water, and said: "Here is my son, who is going to be your husband. I will come and fetch you soon, and you will be very happy together."

Then they swam off with the cradle, and poor, terrified Thumbeline wept bitterly. Now, some little fishes had overheard old Mother Toad, and when they saw the little maid so sad they gnawed away the stem of the leaf, and away it floated down the stream, so fast that the toad could not catch it. Thumbeline became happy again, for everything she passed was so lovely in the sunshine, and the

birds on the branches sang to her as she floated by. A pretty little butterfly hovered round her, and at last settled for a moment on the leaf, for he loved her very much. She was pleased, too, and tied him to the leaf with her sash.

But presently a great ugly cockchafer came buzzing past. He caught sight of her, and snatching her off the leaf, flew up with her into a tree; but the poor butterfly could not free himself, and went floating along downstream. The cockchafer gave Thumbeline some honey to eat, and praised her beauty; but when the henchafers saw her, they said that she was just like a human being.

"How very, very ugly she is!" they all cried; and at last the cockchafer disowned her, and they all flew down with her and set her on a daisy. Then she wept because she was so ugly that the henchafers would have nothing to do with her.

All the summer Thumbeline lived alone in a wood, dining off the honey from the flowers, and drinking the dew that every morning spangled the leaves around her. But then came the cold, long winter; the flowers all died, the birds flew away, and the snow began to fall. Poor hungry Thumbeline wandered through the stubble of a cornfield hard by until she came to the hole of a field-mouse, who dwelt snugly down in the ground, having a room full of corn, and a neat kitchen and store-room.

Thumbeline stood at the door and begged for food.

"Poor little thing!" said the good-natured field-mouse. "Come into my warm room and dine with me." And she soon became so fond of the tiny maid that she said: "You may dwell with me all the winter, if you will only keep my room clean and neat, and tell me stories, for I love stories dearly." And Thumbeline agreed, and was very happy in her new home.

In a few days' time the field-mouse said: "We shall have my next-door neighbour, the mole, in to visit us to-morrow; he comes to see me once a week. He is richer than I am, has large rooms in his house, and wears a beautiful black velvet coat. It would be capital if you married him; but he is blind, and cannot see you, so you must tell him your prettiest stories."

When he came, Thumbeline sang to him, and he soon fell in love with her. He invited them to walk down a long, dark passage that he had just burrowed from their house to his, lighting them with a piece of tinder.

But when they had gone a short distance they found a swallow lying stretched on the floor; the poor bird had evidently died of cold. Thumbeline felt very sorry, as she loved all the birds, but the mole kicked it with his short legs, saying:

"Here's a fine end to all its whistling! What a miserable thing it must be to be born a bird! None of my children will be birds, thank goodness!"

But Thumbeline could not sleep that night, so she got up, and wove a carpet out of hay and then went and spread it round the bird; she also covered it with some warm, soft cotton.

"Farewell, dear bird," said she; "farewell, and thank you for your beautiful song in the summer, when all the trees were green and the sun shone so warmly upon us." And she pressed her head against his big body. To her great surprise she felt something beating within it. It was the bird's heart, and he was not really dead. She quickly laid the cotton more closely round him, and he gradually revived.

He remained underground all the winter, and Thumbeline was kind to him and brought him water and food; but she never said a word either to the mole or the field-mouse.

As soon as the spring came the swallow said farewell to Thumbeline, who would not go with him, because she knew it would vex the old field-mouse if she left her.

Thumbeline was now sad indeed, for she was not allowed to go into the warm sunshine.

"This summer you must work and make your wedding clothes," said the field-mouse, for the blind, dull mole had decided to marry Thumbeline.

So the tiny maid was obliged to work hard at the distaff, and the field-mouse hired four spiders to spin and weave.

Every evening the mole came and talked about how the summer was coming to an end, and he abused the sun and pretty flowers so much that Thumbeline disliked him more and more, and said she would not marry him.

"Fiddlestick!" cried the field-mouse. "Don't be obstinate, child, or I will bite you with my white teeth."

At last the day fixed had arrived, and Thumbeline went to bid a last farewell to the beautiful sun before going to dwell with the mole deep down in the earth.

"Farewell, thou glorious sun!" she cried, as she walked a little way.

"Tweet, tweet!" And she heard a fluttering of wings, and there was the little swallow. She told him her sad fate and how she longed to be free.

"The cold winter will soon be here," said the swallow; "I shall fly far away to the warm countries. Come with me, sweet little Thumbeline, who didst save my life when I lay frozen in the dark earth."

"Yes, I will go with thee," said she; and she seated herself on the bird's back, and then the swallow soared high into the air and flew away over forest, lake, and mountain, until they reached the warm countries. There the sky seemed twice as high and twice as blue, and there grew the loveliest green and purple grapes, and citrons, and melons.

Near a calm, blue lake stood a half-ruined palace of white marble, and here the swallow had built his nest.

"This is my house," said the swallow, "but I will take you to one of the splendid flowers growing beneath us, and you shall dwell in one of them."

But what was her surprise when she saw sitting on the flower a little mannikin wearing a gold crown on his head and the brightest, most delicate wings on his shoulders, scarcely any bigger than herself. He was the spirit of the flower, and in every flower there dwelt one such fairy, and he was their king.

ALL THE FAIRIES CAME OUT FROM THEIR FLOWERS AND BROUGHT THUMBELINE PRESENTS

When he saw Thumbeline he was delighted, for he had never seen so lovely a maiden. So he put his gold crown on her head and asked her to be his queen. And Thumbeline said "Yes," and then all the fairies came out from their flowers and brought her presents, and the best of all was a pair of transparent wings, which enabled her to fly from flower to flower.

"You shall no longer be called Thumbeline," said the king to her, "for it is not a pretty name, and you are so lovely. We will call you Maia."

And she dwelt with him ever after.

NAPOLEON FLIES FROM HIS FIELD OF DOOM, TO CARRY THE NEWS OF HIS FALL TO PARIS

After the defeat of his army and the ruin of all his hopes at Waterloo, Napoleon fled from the battlefield in a carriage. But the Prussians were following so closely that Napoleon had to leave his carriage for a horse, and scarcely had he quitted his seat when the vehicle with its horses fell into the hands of the pursuers. In his haste he left his hat in the carriage.

This striking picture of a great scene in history is from the painting by Mr. Ernest Crofts, R.A., which now hangs in the Walker Art Gallery, Liverpool.

HOW NAPOLEON RODE FROM WATERLOO

THE story is told that, at one moment during the battle of Waterloo, while the Duke of Wellington rode in front of his brave soldiers at Waterloo, saying, "Stand firm, my lads!" or "Hard pounding this, gentlemen; we will see who can pound the longest!" on the opposite side of the terrible battle-field Napoleon sat at a table, his feet buried in straw, his arms resting on the papers before him, his head nodding, his eyes heavy.

What a tragic figure! The great emperor, the terror of the world, in the midst of a frightful battle which would decide the fate of Europe—stunned with ruin, crushed by the certainty of doom. Can you think of anything more strange and sad?

Think of the huge cannons roaring in a great circle of fire and smoke; think of squadrons of horsemen thundering across the plain with sabres raised and shouting their battle-cries; think of long lines of foot-soldiers standing steadfast behind their bayonets, while behind them and over their shoulders the second lines fire, and fire again, at the approaching enemy! Think of the clamour, the noise of cannon and musket, the shouting of men, the screaming of horses, and the thud of galloping hoofs. Think of the movement—the rush of cavalry, the wheeling double of infantry, the terrific shock when two bodies of troops clashed together in hand-to-hand fight! Think of all these things! And then picture with your mind's eye a map-strewn table in the open air, and at that table the Terror of Europe in his grey coat and his long riding-boots, with nodding head and heavy eyes, stunned by ruin.

And when at last he saw that the battle was lost, it was not with haggard, staring eyes of terror that he raised himself to see the truth, but still with dazed and clouded eyes like a man in a stupor. That wonderful flicker of his mind which we read about at Elba had lasted a hundred days. It was quenched at Waterloo. From that moment the great Napoleon was the meanest of men. He stepped off the field of Waterloo into the carriage that was waiting for him. And all about him the torn and bleeding remnants of his shattered army were flying from the enemy. Bodies of galloping horsemen, bodies of running infantry, bodies of sweating artillery toiling at their cannons; a multitude of human wreckage, gasping, stumbling, and groaning, the torn and shredded banners staggering in the air, the knotted bandages round the heads of bearded warriors showing white against the steel-coloured sky—a great host stricken by a panic and rushing in a mad disorder from the roar of death.

Napoleon saw all this through his dazed and clouded eyes.

"Isn't your Majesty surprised?" someone is said to have asked Napoleon.

"No," was the answer. "Since the days of Cressy it has been ever thus."

At Genappe, the Prussians were following so closely that he left his carriage for a horse, and in so doing, it is said, he had to defend himself with his pistols. Scarcely had he quitted his seat when the vehicle with its horses fell into the hands of the pursuers, and so great was this fallen man's haste to get away, that he left in his carriage his hat and sword.

"What shall I do?" he asked, as they rode through the night.

"Ride to Paris," was the answer.

So he rode on, outstripping his army, struggling to rouse the shattered power of his once mighty intellect, beating his brain to tell him how to save his throne.

At four o'clock in the morning he reached Paris, and went to his palace. All he could do when he arrived there was to tramp up and down the big, gilded chambers, exclaiming, "Oh, my God! Oh, my God!"

He was beaten. Judgment had fallen upon him. Twice before, he had returned to Paris with a defeated army. This was the third time, and Paris could forgive no longer. France threw off Napoleon for the last time. They gave him an hour! Think of it! He who had given them an empire, he who had received from them a throne, was given an hour to decide his fate!

He surrendered his throne. For a few weeks he waited in Paris, hoping his soldiers would call him back, and then he rode out of Paris for the last time and gave himself up to a British ship.

LITTLE IDA'S FLOWERS

"My poor flowers are quite faded," said little Ida. "Only yesterday evening they were so pretty, and now they are all drooping! What can be the reason of it?" asked she of the student who was sitting on the sofa beside her.

"Do you not know?" replied the student. "Your flowers went to a ball last night, and are tired, that is why they all hang their heads."

"Surely flowers cannot dance!" exclaimed little Ida.

"Of course they can dance! When it is dark, and we are all gone to bed, they jump about as merrily as possible. They have a ball almost every night."

"May their children go to the ball, too?" asked Ida.

"Yes," said the student, "little daisies and lilies of the valley."

"And where do the prettiest flowers dance?"

"Have you never been in the large garden in front of the king's beautiful summer palace, the garden so full of flowers? Surely you recollect the swans which come swimming up to you when you throw them crumbs of bread? There, you may imagine, they have splendid balls."

"I was there yesterday with my mother," said Ida, "but there were no leaves on the trees, neither did I see a single flower. What could have become of them? There were so many in the summer-time!"

"They are now at the palace," answered the student. "As soon as the king leaves his summer residence, and returns with all his court to the town, the flowers likewise hasten out of the garden and into the palace, where they enjoy themselves famously. Oh, if you could but see them! The two loveliest roses sit on the throne, and act king and queen. The red cocks-combs then arrange themselves in rows before them, bowing very low; they are the gentlemen of the bed-chamber. After that the prettiest among the flowers come in, and open the ball. The blue violets represent midshipmen, and begin dancing with the hyacinths and crocuses, who take the part of young ladies. The tulips and the tall orange-lilies are old dowagers, whose business it is to see that everything goes on with the most perfect propriety."

"That is very funny," said Ida, clapping her little hands; "but could not I see the flowers?"

"To be sure you can see them!" returned the student. "You have only to peep in at the window next time you go to the palace."

Little Ida thought what the student had told her about the flowers was very droll, and she could not leave off thinking of it. She was now sure that her flowers hung their heads because they were tired with dancing so much the night before. So she took them to the pretty little table where her playthings were arranged. Her doll lay sleeping in the cradle, but Ida said to her: "You must get up, Sophy, and be content to sleep to-night in the table-drawer, for the poor flowers are ill, and must sleep in your bed, perhaps they will be well again by to-morrow."

Ida then laid the faded flowers in her doll's bed, drew the covering over them, and told them to lie quite still.

All the evening she thought of nothing but the student's words, and just before she went to bed she ran up to the window where her mother's tulips and hyacinths stood behind the blinds, and whispered to them: "I know very well that you are going to a ball to-night." But the flowers moved not a leaf, and seemed not to have heard her.

After she was in bed, she thought for a long time how delightful it must be to see the flowers dancing in the palace. Soon she fell asleep, but during the night she awoke; she had been dreaming of the student and the flowers. All was still in the room, the night-lamp was burning on the table, and her father and mother were both asleep.

"I wonder whether my flowers are still lying in Sophy's bed?" said she. "I should very much like to know." She raised herself a little, and, looking towards the open door, she saw that the flowers and all her playthings were just as she had left them. She listened, and it seemed to her as if someone must be playing low, sweet music on the harpsichord somewhere quiet near.

"My flowers must certainly be dancing," said she. "Oh, how I should

like to see them!" But she dared not get up for fear of waking her father and mother. At last she could restrain herself no longer, so she crept lightly out of bed, and stole towards the door of the room. Oh, what wonderful things she saw!

There was no night-lamp burning here; it was quite light in the room, for the moon shone brightly through the windows on the floor. All the hyacinths and tulips stood there in two rows, while their empty pots might still be seen in front of the windows; they

to be quite well again, and danced as merrily and happily as the rest. Suddenly, a heavy noise was heard, and Ida saw that it was the rod which she had found on her bed on the morning of Shrove Tuesday. It was certainly a very pretty rod, for a wax doll was fixed on the top, wearing a broad-brimmed hat, with a blue and red ribbon tied round it. It hopped upon its three red stilts in the middle of the flowers, and stamped the floor with its feet. It was dancing the mazurka, which the flowers could not dance;

"The two loveliest roses sit on the throne and act king and queen, and all the prettiest flowers come in and open the ball," continued the student. "That is very funny," said Ida, clapping her little hands.

performed figures, and took hold of each other by the long green leaves. At the harpsichord sat a large yellow lily, bowing her long yellow face now on one side, now on the other, and nodding her head to mark the time. A tall blue crocus now stepped forward, sprang upon the table on which lay Ida's playthings, went straight up to the bed, and drew back the curtains. There lay the sick flowers, but they rose immediately, and greeted the other flowers, who invited them to dance with them. The sick flowers appeared

they were too light-footed to stamp. A loud knocking was now heard from the drawer in which lay Ida's doll. It was Sophy who made the noise. She put her head out of the drawer and asked in great astonishment:

"Is there a ball here? Why has no one told me of it?"

"Will you dance with me?" asked the nut-crackers.

"Certainly you are not a very fit person to dance with me!" said Sophy, turning her back upon him. She then sat down on the table, expecting that

one of the flowers would come and ask her to dance, but, as no one came, she suddenly let herself fall down upon the floor, which excited a general commotion, so that all the flowers ran up to ask her whether she had hurt herself. They were all very polite, especially Ida's flowers, who thanked her for the comfortable bed in which they had slept so quietly, and then seized her hands to dance with her, while all the other flowers stood in a circle round them. Sophy was now quite happy.

Just then the door was suddenly opened, and a number of flowers danced into the room. Ida could not conceive

Sophy, Ida's doll, put her head out of the drawer in which she lay, and asked in great astonishment: "Is there a ball here? Why has no one told me of it?" "Will you dance with me?" asked the nut-crackers.

where these flowers came from, unless from the king's garden. First of all entered two beautiful roses wearing golden crowns, then followed stocks and pinks, bowing to the company on all sides. They had also a band of music with them; great poppies and peonies blew upon pea-shells till they were quite red in the face, while blue and white campanulas rang a merry peal of bells. These were followed by an immense number of different flowers, all dancing—violets, daisies, lilies of the valley, narcissi, and others, who all moved so gracefully that it was delightful to see them.

At last these happy flowers wished one another "good-night"; so little Ida once more crept into bed to dream of the beautiful things she had seen.

The next morning, as soon as she was up and dressed, she went to her little table to see if her flowers were there. Yes, there lay the flowers, but they were much more faded than yesterday. Sophy, too, was lying in the drawer, but she looked very sleepy.

"Can you not remember what you have to say to me?" asked little Ida of her; but Sophy made a most stupid face, and answered not a syllable.

"You are not at all good!" said Ida; "and yet all the flowers let you dance with them." She then chose out from her playthings a little pasteboard box with birds painted on it, and therein she placed the faded flowers. "That shall be your coffin," said she, "and when my cousins come we will bury you in the garden, in order that next summer you may bloom again, and be still more beautiful than you were this year."

THE FABLES OF ÆSOP THE SLAVE

THE GOAT AND THE LION

A LION one day saw a goat upon a steep, craggy rock, where he could not climb up to him, so he said: "What pleasure can you possibly find in jumping from one rock to another all day, and risking your neck every moment? I wonder that you do not come down here and feed in the meadow, where there is plenty of fresh, sweet grass."

"Well," replied the goat, "what you say may be very true; but, to tell you

the truth, you look so uncommonly hungry and fierce that I do not care to take the risk and venture too near you."

Beware of the advice of people who want to gain something from you.

THE CROW AND THE PITCHER

A CROW, almost dying with thirst, found a pitcher, or tall jug, which had

a little water in the bottom. Unfortunately, the crow was not able to reach the water. Again and again he tried, but without success. Then he tried to knock the pitcher over, so that he might get at the water; but he was not strong enough for this.

At last he noticed a quantity of little pebbles lying about. After much trouble and labour he gathered these together, and, dropping them into the pitcher one by one, he at last raised the water up to the brim, and so was able to drink.

Where there's a will there's a way.

THE TWO FROGS

ONE hot summer, when the country was parched and the lakes and ponds had nearly all dried up, two frogs were

travelling together in search of water. At last they came to a deep well, and, sitting upon the edge of it, began to discuss whether they should jump in. One of them was in favour of doing so, urging that there was plenty of clear water and no danger of being disturbed; but the other thought for some time, and then answered: "That is all very well; but I do not care to jump in, because if the water should happen to dry up here, how shall we get out again?"

Always look before you leap.

THE LION AND THE FOUR BULLS

FOUR bulls who were great friends always kept near one another and fed together. A lion had often watched them, and wanted to kill one for his dinner. But he was afraid to attack all four together, knowing that they would defend one another. So he began by telling one of the bulls stories about the others to arouse jealousy and bad feeling among them.

The result was that the four bulls quarrelled and no longer went about in company. They separated and roamed

alone. Then the artful lion was able to kill and devour the bulls one at a time.

Remember that union is strength.

THE NEXT STORIES ARE ON PAGE 3575

A FRENCH LESSON IN PICTURE: THE NAMES OF FAMILIAR OBJECTS IN THE COUNTRY

This picture teaches us the French names of familiar things in country life. Reading from the left we have the roof, window, and bell of a little house, and a cyclist is passing on a bicycle. A shop with its chimney-pots and their smoke, its shutters, door, plate-glass window, and the owner's name, Durand—as familiar in France as our Smith or Jones—is a background to a woman and her baby and an automobile, with its chauffeur, lady and child, wheels, lantern, and dust. To the right are the pathway, palings, tree, and the footpath leading to the cottage. Then comes a horse pulling a gig, with reins and whip, along the road past a milestone. Beyond, we see the plough in the field, and hills, clouds, and sky above.

WHAT IS WRONG WITH THIS STEAMER?

When we visit the docks or stand on a busy wharf at a large seaside town, we often gaze at the great ships that bring us the wheat and the timber and all the wealth of the world for use in all parts of the country. Here is a picture of one of these great steamers, and in making his drawing the artist has made at least ten mistakes. Can we find out where he is wrong? We can compare our list with that given on page 3616 of this book.

HOW TO PRESERVE REAL FLOWERS

CONTINUED FROM 3398

WHEN we look at all the gay flowers in the garden during the summer, we feel sorry that they will last only such a short time. A clever German has discovered a way by means of which real flowers may be preserved in their natural colours, and these will last a good many months without fading. It is not very difficult to deal with flowers in this way, and if the directions are carefully followed one is almost certain to meet with success.

In order to preserve the flowers a large and rather shallow box should be obtained. We shall not want the lid, and even the bottom must be knocked out, so that we have a kind of frame. Across the inside of the frame, nail a piece of wire netting with the mesh about the same as that used for rabbit-hutches. This is fixed in its place instead of the bottom of the box in order to give a support to the flowers, which we shall put in presently, and yet to allow the air, which will dry the blossoms, to come freely through. We next get a board which is quite flat and large enough for the frame to stand on, leaving a little space all round. The only thing that is now required is a quantity of silver sand, and this can be bought at any stores.

When we get the sand it will have a lot of dirt mixed with it however clean it may look, and this must be removed. The best way to get rid of the dirt is to put some of the sand into a large pie-dish, and then pour some water on to it. A great deal of the dirt will float upon the surface of the water, and if the liquid is poured away many of the bits will go also. But we shall have to repeat this process several times with each lot of sand until it is quite clean; the best way to judge as to whether it is ready or not is to take a little in the palm of the hand, and see whether we can find any black pieces amongst the white mineral grains. When all the sand has been washed in this way, it should be spread out on a tray and allowed to become perfectly dry. Great care must be taken that it does not get dirty again. The time has now come when the flowers may be gathered in the garden. Some kinds are much more easily preserved than others, and it will be found that roses, asters, and chrysanthemums are especially good. In a general way white flowers are not so successful, as the petals are apt to turn rather a dirty yellow in colour. Pinks and crimsons are perhaps the best colours of all, though one cannot well discover those which will answer the purpose without trying them. The flowers must be quite dry and free from rain or dew, and as perfect as possible.

We place the frame on its stand of wood with the wire netting downwards. First of all we put a thin layer of the clean sand inside, and after this place the flowers on the wire netting, spreading the petals with our fingers. It is now time to cover in the flowers with a layer of sand, and this should be put on very evenly. In the case of some flowers it is a good plan to turn the heads upwards before covering in with sand. Supposing the flower is bell-shaped, such as a tulip, the inside must be filled with the sand. When the flowers are quite covered in, if the box should be deep enough, one more lot of blooms may be arranged. As a rule, it is not a good plan to have more than two layers of flowers in each box.

The frame containing the drying flowers may now be removed, and it should be placed in a warm, dry place. Of course, the bottom part must be taken with it, or all the sand will fall out. A good position for the frame is on a shelf in a sunny greenhouse, where the drying process can go on quickly; or, failing this, somewhere in the kitchen. After about ten days we may take a peep at our flowers by just pushing away a little of the sand; if the blossoms feel crisp and dry the time has come to take them out. Supposing, however, that they are still moist, they must be left in the sand a little longer. When the specimens are quite finished they may be taken out from the frame, care being exercised in handling them, as at this stage the petals are very brittle. It will be found that the blooms are nicely preserved, and in such a condition that they will last without any water being put into the vase or bowl which contains them.

HOW TO MAKE SWEETS AT HOME

We are all fond of candy, but perhaps some of us have never tried to make our own. Many kinds of candy are so simple to make, and give such little trouble, that we may like to try some of these recipes.

BURNT ALMONDS

Dissolve 1 lb. of light brown sugar in a teacupful of water, and stir this in a pan over the fire until it comes to the boil. Cease stirring for two or three minutes; then add ½ lb. of blanched almonds, and stir quickly until the sugar browns and coats them. Turn them on to a wire sieve to cool, dividing any that may have become joined together.

PEPPERMINT CREAMS

Mix in a basin 3 ozs. of arrowroot with three gills of cold water until smooth. Put this into a lined saucepan with 1 lb. of white sifted sugar, and keep stirring it. Let it boil for ten minutes; then move the saucepan off the fire, but stir the contents till cool. Flavour with a few drops of peppermint essence. Take up lumps of the mixture, roll them into little balls, and put them on a slab of marble that has been buttered slightly to prevent sticking. When cold, roll the creams in icing sugar. These candies are also made by flavouring fondant mixture with peppermint.

CREAM FONDANTS

Put into a pan on the fire 2 lb. of granulated sugar, and pour on to it a small teacupful of hot water. Allow this to boil about eight minutes, or till it thickens, but on no account stir it. To test it, take up a little on a new wooden skewer. If a thread forms on taking a drop between the thumb and first finger and separating them, pour the mixture into a bowl and, while warm, beat it with a wooden spoon till creamy. As it cools flavour it with vanilla, raspberry, or some other essence, and colour half of it pink with cochineal. The candy is then ready.

CHOCOLATE CREAMS

Take some of the fondant mixture and roll it into balls with the hands. Place the balls on a sheet of oiled paper and leave it for twenty-four hours. Cut up about a quarter of a pound of some unsweetened chocolate and soften it in a pan standing in another one of boiling water. Add to the chocolate two tablespoonfuls of water and 2 ozs. of icing sugar, and stir it smooth. A tiny lump of butter and a few drops of cream improve the chocolate. Drop the fondant balls into it, get them out with the aid of a fork, and lay them on paper to cool and dry.

COCOA-NUT BALLS

Put into a pan and boil, unstirred, ½ lb. of white sugar and three-quarters of a small teacupful of water until a few drops crackle when dropped into cold water from the end of a wooden skewer. Now stir in 1 oz. of desiccated cocoa-nut. Take lumps of the mixture and roll them into little balls.

BARLEY SUGAR

Put into a pan and boil 1 lb. of loaf sugar, a small teacupful and a half of water, and a tiny pinch of cream of tartar. Test it by dipping in a wooden skewer and plunging this in cold water. If the sugar is brittle, it is ready for the addition of the juice of a quarter of a lemon and a little saffron colouring. Let it boil to 300° F. by the thermometer, pour it on to a sweet-oiled marble slab, and cut it into strips with scissors. Twist these and store them in glass bottles.

VANILLA CARAMELS

Boil over the fire in an aluminium or tin-lined saucepan, stirring frequently, 1 lb. of loaf sugar, three dessert-spoonfuls of glucose, and a small teacupful of water. Test it by dropping a little into cold water. If it hardens, add one gill of cream and ½ oz. of butter. Boil again, stirring frequently, till a little turns brittle on being dropped into cold water; then flavour with vanilla essence and pour the caramel on to a tin or oiled marble slab. Cut it into convenient squares and wrap them neatly in oiled paper.

NOUGAT

Blanch and chop coarse ½ lb. of almonds and dry them in the oven. Put ½ lb. of castor sugar with one dessert-spoonful of lemon-juice into a pan, and stir it with a wooden spoon till it colours slightly. Drop in the almonds. Pour the nougat on to a marble slab, press it into cubes or mark it in squares with a knife dipped in hot water, and break them up when cold.

TURKISH DELIGHT

Melt 1 oz. of gelatine in a teacupful of cold water, and put this into a saucepan with 1 lb. of fine sugar and the juice of an orange and a lemon. Boil it up three times and then simmer it about twenty minutes till sticky. Butter a soup-plate and pour half the mixture into it. Colour the remainder with a few drops of cochineal, pour it on to the rest, and set it to stiffen. Then warm the plate slightly to loosen it, turn it on to paper dusted with icing sugar, cut it into squares, and sugar these also. Store it in a tin.

MARZIPAN POTATOES

Prepare some marzipan as described in making Easter eggs, on page 2975, or mix half a pound each of castor sugar and ground almonds with the white of one egg, beaten stiff and flavoured with essence of almonds. Shape pieces into the form of new potatoes, punching dents for the "eyes" with a skewer. Roll the potatoes in cocoa essence in order to coat them brown.

MARZIPAN FRUITS AND NUTS

Strawberries, cherries, mushrooms, dates, and walnuts can be made with marzipan. The hulls of the strawberries are cut out of green crinkled paper, the stalks of the cherries of twists of paper or green-covered wire. The marzipan is shaped and rolled in sugar coloured with cochineal and placed on paper to harden.

Real fruit may be halved and marzipan placed between the halves.

A mushroom is shaped by flattening a lump of marzipan in the hand and hollowing

a centre for the stalk. Dust the under side with cocoa essence. Roll some marzipan for the stalk, and dip one end in white of egg to make it stick in the hole. If the white part looks too yellow, moisten the surface with white of egg and dust it with sifted sugar.

A flattened lump of marzipan can be inserted between the two halves of a dried walnut or replace the stone of a date.

Acorns in cups and numbers of delicious bonbons can be devised out of marzipan.

MARSH MALLOWS

Dissolve 2 ozs. of gum arabic in one gill of cold water. Warm and strain it into a pan over a fire, with 4 ozs. of icing sugar, stirring constantly till a little forms a ball when dropped into cold water. Remove the pan, add one and a half whites of eggs previously beaten stiff. Flavour with caramel essence. Stir and turn mixture on to a tin sprinkled with icing sugar to set for twelve hours. Cut into cubes and dust these with icing sugar.

THE GAME OF STICKERCHIEF

A SPLENDID game that can be played by any number of children is "Stickerchief." It is quite as exciting as hockey or lawn-tennis, and it has the advantage of not requiring expensive balls, racquets, or sticks.

Stickerchief is played with a handkerchief and some short pieces of bamboo, of the sort used by gardeners to hold up tall flowers. A dozen of these bamboos can be bought at any florist's for one shilling.

The game can be played on a lawn of any size, and the grass will not be injured, as it is not necessary to make any white lines on it. We have only to make two goals, one at each end of the lawn, and these will merely be formed by the flower-sticks stuck into the grass about four feet apart. When we have placed two sticks at each end of the lawn in this way we can begin.

It is best to make the first attempt with only two players. Each must have one of the light bamboo sticks, and they must stand in the centre of the lawn between the two goals. Now they must place a handkerchief on the ground, and stand on opposite sides of it with the ends of the sticks just touching the ground, about a foot away from the handkerchief, as we see in the picture.

The game of stickerchief as played by a boy and girl

Then one player must count "One—two—three—go!" and at the word "Go" both must try to pick up the handkerchief on the sticks. This is much more difficult than it looks. Each player tries to knock his opponent's stick away.

Presently one manages to pick up the handkerchief, and then runs as fast as he can towards the opponent's goal. Of course, the other player follows, and tries to get the handkerchief off the stick. If he manages to get it on to his own stick he rushes with it to the other goal.

In a few minutes both players become tremendously excited, for often they get within a few feet of the goal before they drop the handkerchief. Then they have a fine struggle for it. Sometimes the handkerchief flies off the stick while the player is running with it, and then the other player can often catch it before it reaches the ground. Sometimes it is skilfully knocked off, and sometimes neatly lifted off Any way is considered fair; the game is simply to get the handkerchief through the opponent's goal and to prevent him from scoring. A game is finished when a goal is scored. A match consists of five games, and the player who wins the larger number of games is the victor.

After a little practice any number of children can play together. Two captains are chosen, and these captains pick the players who are to form the teams. Four, six, or even ten players may be in each team; in fact, the only limit is the size of the lawn.

When all are ready, and have been provided with the sticks, the captains tell the players where they are to stand—some close to the goal, and others near the middle of the lawn. Then the captains take their places by the handkerchief, and start the game at the word "Go." Of course, it becomes ever so much more exciting when a number are playing, and often it is quite a long time before either side can score a goal.

If there are many players on each side they ought to be distinguished in some way, so that they can be recognised at once as friends or foes. It is a good plan to tie little bows of ribbon in the middle of each stick. One side can have green bows and the other red. These look pretty, and are far more easily seen than colours worn on the sleeve.

The game is a splendid one for a children's party, as boys and girls can play together. It has all the fascination and excitement of hockey, without the danger of bruises that are too often caused by hard balls and heavy sticks. The light bamboos used for "Stickerchief" cannot hurt anybody.

A LITTLE VEGETABLE GARDEN
WHAT TO DO IN THE MIDDLE OF JUNE

THERE is time now to look round and enjoy the sight of the rapid growth of all that we have planted. Yet we may not be idle. The tomatoes that we planted in the warmest corner we could find will need careful watering, and it is not enough to pinch out the side shoots once or twice: we must go on pinching them out as they appear.

The stems of the potatoes have grown considerably since we made our first earthing-up of the soil around them, so we may now earth-up higher than was possible at first.

If the soil be very dry where the peas are growing we must water them frequently, or put a top dressing of stable manure over the surface of the soil round about them. A top dressing of littery manure both in the flower garden and in the vegetable garden is often used. It is best applied after rain while the soil is moist; in this state the top dressing will prove a valuable means of keeping the moisture in the soil and preventing evaporation when the sun is hot upon it. Another means is to use the hoe frequently, and we have already learned how this was effectual—the moisture is lost more quickly when the tiny atoms of soil lie close together than when they are loose.

We must remember that it is not well to pull our rhubarb too closely; for each stem pulled the plant loses a great leaf, and if too many be pulled the loss is felt unduly. Now that gooseberries are in season for cooking, we should give our rhubarb a little rest, or, at any rate, pull sparingly for a time; later on, in a month or less, according to the weather, we may begin to pull again, for a juicy second crop of young stems will have grown up. Many people prefer to wait for this second crop before making rhubarb jam.

As the lettuces, or, in fact, any crops, become ready for use, make no long tarrying before beginning to use them. To wait till the whole crop becomes ready to be eaten is a fatal mistake. Rather begin to pull too soon than too late. It is a well-known fact that the more peas we pick the more we shall be able to pick, for if we relieve the plants of the many pods they bear as soon as these pods are ready for use, the plant has sufficient strength immediately to produce fresh pods. With other crops—lettuces, for instance—if we do not begin to use them as soon as we should, some of the plants will run away to seed before we can eat them.

The first crop of Lima beans should be planted by this time with another sowing later.

If we have some raspberry-canes, it is a good thing to put a top dressing over the soil in which they are growing. This dressing may consist of littery stable manure, but if this is not to be obtained, use a sprinkling of the mown grass, or some half-decayed leaf mould; the main thing is to give the canes all the moisture that is in the soil, and therefore, by this top dressing, to prevent evaporation.

In the flower garden we have now all our summer plants in their places, and if everything is not as neat and trim as it can possibly be made, no time should be lost in putting it in order. Perhaps we have plants that we have been growing in pots—our fuchsias and geraniums and others. These may well be planted out for the summer. The geraniums should have the sunniest place we can find, and it is better not to water them very frequently if we want plenty of blossom. Abundance of moisture will give us large plants with large leaves, but very few flowers. The geranium has a great deal of moisture in itself; the green stems are soft and juicy, and such plants are better kept rather dry. They go to England from South Africa, and are able to bear very hot sunshine and dry weather.

If we have a greenhouse, we have probably that beautiful rose, Maréchal Niel, in it. It flowers under glass earlier than roses grown out of doors, and needs pruning at a different time—when it has finished flowering.

If we have the care of a greenhouse as well as of a little garden, we are bound to think of how we are to stock it. Now is the time to sow cineraria seed. The best way is to sow the seed in pots or pans, which should be kept covered with a piece of glass until the seedlings appear. We must stake our dahlias and other plants as soon as they need it. The stakes must be planted firmly in the soil.

Any ferns or other hardy plants, or rose-trees that have been planted during the spring, will need more care and more frequent watering than plants that have been established all through the winter and have become hardened.

DRAWING A CAT WITH THE AID OF TWO COINS

THE four little pictures shown here prove to us how very simple a thing it is to make amusing drawings. We need a ten-cent and a five-cent piece, a pencil and a piece of paper. We first put our ten cent piece on the paper and draw a circle round it; then we place our five cents to the right, overlapping slightly, and run our pencil round its edge, being careful not to cut into the first circle.

The ears, eyes, nose, mouth, tail, and two curves for hip and elbow, are then inserted, and a few more strokes complete our pussy.

HOW TO MAKE OLD CLOTHES NEW

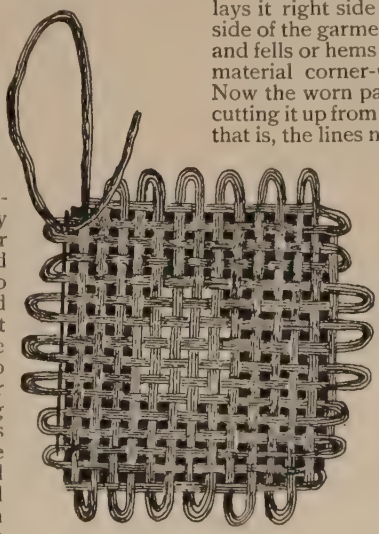
A LESSON IN DARNING, PATCHING, AND MENDING

EVERY girl should know how to repair the inevitable damage done to her clothes by constant wear and tear, and there can be no comparison between a hasty, bungled mend and a neat patch or a smooth, even darn. Let us first consider darning, work which incompetent needlewomen often dislike very much. We are going to see how, with a little patience, we may obtain quite beautiful results.

DARNING

The darning thread should be fairly soft, not too coarse for the material, and as like it in colour and texture as possib'e. When about to darn a stocking we thread the long-eyed darning needle by holding it in the right hand, point downwards, loop the end of the woollen mending over it, draw the needle out of the stretched loop so formed, and with the finger and thumb of the left hand press the looped mending through the eye. No knot is wanted.

We start darning on the wrong side at the left bottom corner of the hole—not close up to it but outside the part wearing thin, for, if the darn is not begun beyond it, this worn part will give, through the increased strain, directly the stocking is put on. The stitch is really a weaving of the mending thread with the worn and broken threads of the stocking, the needle taking up as many stitches as it can conveniently hold, picking up a thread, then leaving one, first in a row away from us, then in a row towards us. We must then take care, before drawing the thread up loosely with the right hand, after taking the needleful, to hold down with the left thumb the loop forming at the end of the thread, and leave it there to allow for shrinkage in washing. We should also be careful not to pucker the material when pulling the thread. The stitches are repeated in the same direction, backwards and forwards, and the thread crossed over the hole when we arrive at it. It is better not to let the row of loops at the ends be in line, but in steps up to the longest stitches made across the hole, then down again beyond it. This prevents too great a strain on the two threads at the ends of the darn; but, of course, the shape of the darn must depend on that of the hole.



1. A darn

Having finished this warp darning, we cut the mending thread, turn the stocking round to the left and cross the previous threads as shown in picture 1, in a kind of lattice-work, taking care not to pierce the darning already done, but passing the needle over and under the strands alternately. The crossing is done in a regular oblong. Careful darners always put a hard wooden ball in the foot of the stocking and mend on that.

PATCHING

When a garment becomes worn and ragged in one part, and the possibility of darning it is hopeless, we have to patch it. For the patch we want a piece of material to match the garment. This is a matter of importance, for it would not do to use a thinner, more flimsy piece of material, and equally it would not do to apply a thicker, more coarsely woven one. If the colour of the garment has faded, and we have a piece of unused cloth in which the colour is still bright, we can usually make the colour fade by exposing it to the sun or washing it in water with a little soda dissolved in it.

We will suppose a little girl has worn a hole in an under garment, and she is going to sew on a patch. She lays the piece of calico over the garment with the hole in the centre, and cuts out of it a square or a four-sided piece, according to the shape of the hole. The piece must be a good deal larger than the hole. Next she lays the garment on the table right side downwards, folds over the edge of the patch on to its right side and lays it right side downwards on to the wrong side of the garment. Then she tacks the patch, and fells or hems it on, folds the patch with the material corner-wise, and turns the garment. Now the worn part has to be taken away by cutting it up from the hole along the diagonals, that is, the lines made when she folded the material from corner to corner, as if she wanted to make a triangle, until a point is reached clear of the worn part, and enough material is left to turn under and sew on to the patch, as shown at B in picture 2; A, of course, shows the outer edge of the patch, and C is the original hole. In sewing round this inside square, care must be given to the corners. She snips these up a little way and turns the edge under with her needle. The patch should lie flat; it will do so if the width between the fell and the sewing is three-eighths of an inch wide.

A flannel patch is herringboned on to a garment as shown on page 935, for the patch would not lie flat if it were filled and sewn on exactly like a calico patch. For a patch at the elbow or near a seam, rip up the seam, and make a new one for one side of the patch. Be careful to see that the patch and the material have their threads running in the same direction.

REPAIRING A SLIT

Slits will sometimes spoil the nicest frocks. A straight, clean-edged slit is easy to repair, for we can place the two edges together and darn or fine draw it—that is, draw it together

with fine warp darning stitches; but a three-cornered or jagged slit is more difficult to treat. The method depends on the nature of the tear; sometimes a patch may be necessary. If the material be striped, the edges can be placed together and run on the wrong side. In doing this we slope the running to a point at both ends. Such a little seam is only possible when the stripes are narrow and close together.

In the case of a three-cornered tear, we may darn the edges together, using either No. 60 cotton or fine silk, according to the material. No loops are left at the ends as in stocking darning, and the darn is fine drawn with very fine stitches placed close together, so that they are hardly visible to the eye.

2. Patching

A three-cornered tear is often successfully treated by hemming a patch on the back of the material with very fine stitches, and tucking in the frayed edge of the tear with the needle just enough to allow the edge to be hemmed down with fine stitches on the right side. The hems must be quite close together, or the patch will show through. A clean tear in a woollen garment may be mended in fish-bone stitch, as shown in picture 3.

3. Fish-bone stitch

GLOVE MENDING

How long gloves would last if those dreadful holes did not come as it were by magic!

A common fault in glove mending is the use of too coarse a cotton or silk. We should choose quite a fine kind and use a small needle. Then, when the seam of a kid glove splits, it is easy to make the same little stitches as the glove-maker did before. In mending holes in cotton or silk materials, it is best to put the finger of the glove with the hole in it upon the first finger of the left hand, and fine draw the hole. As the hole is usually close to the seam at the tip, we can use the material turned under at the seam, to make a foundation for the tiny darn. We must fasten off the thread on the wrong side, or we shall get that unsightly thread popping out of the finger-ends like a jack-in-the-box. A tear is more troublesome to repair, and this usually comes in a new pair of kid gloves, the skin of which has become rotten, or has a thin, weak spot. If the glove be longer than is really necessary, we can cut off a little strip at the sleeve-end, shape a piece to fit in the tear, and stitch in the patch in the same way as the seams are sewn.

The fewer punctures of the kid with the needle the better. Drawing the two edges close together usually makes matters worse, for the kid is likely to tear in a fresh place.

OUTDOOR GAMES FOR BOYS AND GIRLS

BUTTERCUPS AND BEES

THIS is a new game, but may prove good fun. There should be an even number of players, say, twelve — six girls and six boys: that is, six buttercups and six bees. The buttercups sit or stand on the lawn in a row, each holding a cup made of a piece of paper, twisted into the shape of a fool's cap. A number is pencilled on the inside of each — 1, 2, 3, 4, 5, 6 — according to how many buttercups there are. The bees then stand a short distance away, each with a little ball of crumpled paper. These are numbered as the cups are; but before beginning the game, the boys should exchange balls with one another, so that the buttercups cannot possibly tell the number of any boy's "bee." For the same reason the girls should exchange cups. This being done, and the lines formed again, the paper balls, or bees, are tossed all at once into the air towards the buttercups; the higher the better, and the buttercups do their best to catch them. Any player whose cup-number is the same as that on the bee it has caught changes places with the boy who threw it, and the last couple to do this ends the game. The winners are the couple who have become buttercups or bees in turn the greatest number of times during the game. As some may find it difficult now and then to catch the bee in the cup, it is quite allowable to pick it up from the grass where it has fallen, and drop it in. The exchanges should take place every time the bees are returned, as there would be very little fun to any of the players if either side knew the numbers of the others.

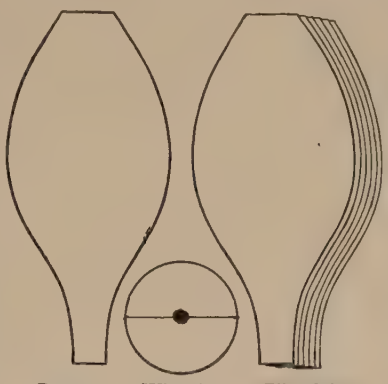
BATTLEDORE AND SHUTTLECOCK

THIS game is about six hundred years old, and is still popular. The battledore is made of stretched parchment like a little drum, with a long, light handle. The shuttlecock should not have too many feathers, or it will not fly quickly enough. At first it may seem difficult to keep it in the air with the battledore, but this will soon become easy. Although one player can play alone, it is much better when two players play together, striking alternately at the shuttlecock and keeping it in the air as long as possible. The player who misses loses, and the other player counts a point. If there are several players, they stand in a ring, and pass the shuttlecock from one to the other, the first who fails to strike it being out. The last player left is, of course, the winner.

MAKING A HOT-AIR BALLOON

ALMOST everyone has seen the big paper balloons that are sent up at firework displays. Generally they are made to carry coloured lights, so that when the balloons fly away they can be seen until they rise to such a height that they look like tiny stars in the sky. These balloons are made of tissue-paper, and they are not filled with gas, but with hot air. It is quite easy to make one.

At any stationer's shop we can buy large sheets of tissue-paper. It is best to buy a quire, which will cost about ten cents; and, if possible, we should get two colours. Then we can make our balloon with coloured stripes. When we have got the paper, we must lay it all out flat on a table. Then, with a soft pencil, we can draw on the top sheet the shape shown in picture 1, but as large as possible on the paper that we have. When we have marked the shape, we can fold the first sheet down the centre from top to bottom. This will show us if the two sides of the shape we have drawn are the same. If they are, we can cut round the pencil-lines with a pair of scissors. This first sheet will now form a pattern for all the others. We should lay it over them and cut very carefully through the remaining twenty-three sheets with the scissors, so as to make them all exactly the same size as the first one. We now have to stick them all together very firmly.



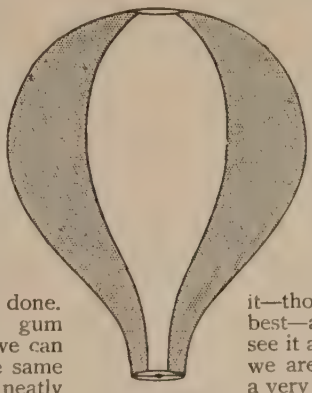
1. Pattern cut out 2. Wire ring and wool 3. Pile of sheets for gumming

We first take a white piece and lay it flat. Then place over it a red or blue piece, so that on one side a little of the white shows. Put another white and another coloured one over them in the same way, always leaving a little of the edge of each sheet showing. Picture 3 shows clearly how this must be done. We next brush some thick gum over the edges. In this way we can gum five or six pieces at the same time, and do it much more neatly than if we did each piece separately.

When the gum has been spread smoothly, we pick up the top sheet and carefully stick the edge to the ungummed side of the sheet below. The same thing is done with six sheets, using white and coloured pieces alternately, and then joining the first and the last sheets. We shall now have a paper balloon, complete except for a small hole in the top. To cover this we cut a circular piece from some of the paper we have left over, and then stick it carefully and very neatly over the hole.

When the gum has dried, we must put the nose of a pair of bellows into the opening at the bottom and blow air in gently. In a few minutes our balloon will expand, and we can see if all the edges have stuck properly. If they have not, we must put on a little more gum, because, of course, the balloon must be air-tight.

We must now measure the opening at the bottom, and with a piece of thick wire make a ring that will just fit into it. We fix one piece of wire across the centre of the ring, as shown in picture 2, and in the middle of this straight piece put a little tuft of cotton-wool. Now we very gently fix the ring into the opening, fold the edge of the paper over it, and gum the folded part down firmly. Our balloon is now quite finished, as we see it in picture 4. Taking it out into the garden, we choose a place sheltered from the wind, and then pour a little alcohol or oil on the cotton-wool, being very careful not to let any of the spirit get on to the paper. When it is all ready, we should get somebody to hold the balloon up for us while we put a match to the cotton-wool. We must do this very, very carefully, because everything depends upon this moment. If the little flame from the spirit touches the tissue-paper, it will, of course, burn a hole in it. In a few minutes the hot air will make the balloon expand till it is nicely rounded out. Holding it until it looks quite full, we then gently let it go. It will rise very quickly into the air, and will go to a tremendous height. We shall have plenty of paper left, and can make another at once. If we send the next one up at night, we can tie a small firework to it—those called Bengal lights are the best—and then we shall be able to see it as long as the light burns. If we are very ambitious, we can make a very much larger balloon by sticking sheets of paper together before we begin to cut out the shaped pieces. The whole secret of sending up the balloons is to choose a starting-place sheltered from the wind. Of course, on a very windy day it is no use trying at all. A moderate breeze does not matter, because if the balloon is sheltered until it has risen a little way it is safe.



4. The completed balloon

There is no danger, because the balloons are taken into the garden before the spirit is used. Even if the tissue-paper catches fire through our want of care, it can be crumpled up and put out in two seconds.

DELICIOUS COCOA-NUT ICE

Cocoa-nut ice can be made with or without milk, but it is certainly nicer and smoother when made with it. To make a really nice sweetmeat we shall want ingredients in the following proportions: half a pound of desiccated cocoa-nut—the word desiccated only means dried, but it is the proper thing to ask for when buying it at the grocer's—one pound of loaf sugar, a small teacupful of milk, and half a teaspoonful of carbonate of soda.

First we put the sugar into a large enamelled saucepan and pour the milk on to it. Then we put the saucepan on the stove, and let the contents come to the boil, stirring all the time to prevent burning. We can tell when it boils by the fussy bubbling it makes. The milk is allowed to go on boiling for five minutes, while we are still very careful to stir rapidly. Then the carbonate of soda is stirred in. The contents of the saucepan must not be allowed to boil over. Next we take the saucepan off the fire, and stir the cocoa-nut into it. A shallow tin is lined with a piece of white paper, and half the contents of the saucepan are poured into it. A few drops of cochineal are then stirred into the remainder in the saucepan, to make it pink, and this is poured on to the cocoa-nut ice in the tin.

We must next press the surface of the cocoa-nut ice even with a knife, and set it aside to cool. When it is cold, we take a sharp, broad-bladed knife and cut it into bars as it lies in the tin.

Some people make cocoa-nut ice without the carbonate of soda; but the addition of a little certainly gives lightness to it, makes it more digestible and nicer to the taste. Such a candy is perfectly wholesome, and is not at all likely to make us ill after eating it.

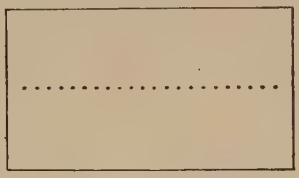
HOW TO PASS THROUGH A POSTCARD

It seems almost impossible to pass one's whole body through a plain postcard, and yet it is fairly simple to do so.

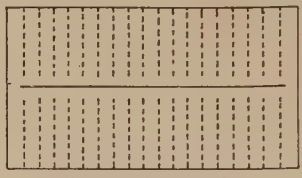
We must take an ordinary postcard, or, if we have not got one handy, any piece of card or paper the same size will do as well, and cut a slit across the middle to within a quarter of an inch of each side, as shown in picture 1.

We must then very carefully make straight cuts, about a quarter of an inch apart, from the top and bottom edges of the card to within a quarter of an inch of the slit that we have already made down the middle, as in picture 2.

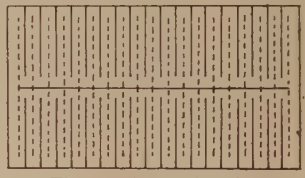
We next make straight cuts from the original slit in the middle of the card to within a quarter of an inch of the top and bottom, taking care that these come exactly in the centre of the spaces between the cuts made from the outside edges. The final result of the cutting is illustrated in picture 3. If we now pull each end of the card we shall find that we have in our hands a long, endless, zigzag ribbon. We should fold the corners of the zigzag ribbon back carefully, and when this is done we have a huge paper hoop through which our body can easily pass.



1. Where to make the first slit



2. The second series of cuts



3. The complete series of cuts

ANSWERS TO THE PICTURE PUZZLES ON PAGE 3389

On page 3389 are twelve little pictures, in each of which the artist has made a mistake. The following solutions are the correct ones:

1. The shells are those of a walnut, but the kernel that has apparently come out of them is that of a Brazil nut.

2. The little girl is gazing out of the window at the crescent of the moon, which is in a position in which it never appears to us.

3. The buttons on the man's coat are on the left side, whereas they ought to be on the right side of the opening in front.

4. This chicken has a duckling's beak.

5. A lion cannot climb a tree, though many other members of the cat tribe can do so.

6. Hens and chickens never enter a brook, pond, or river for the purpose of taking a swim.

7. Tigers do not eat grass or hay, but live entirely upon flesh. They are carnivorous.

8. The rabbit in the picture has a tail similar to that of a squirrel.

9. This curious animal is an echidna, commonly called an Australian ant-eater. In this drawing it has the hind legs of the ornithorhynchus. The hind legs of the echidna are shaped backwards and outwards, and are not webbed.

10. The antelope shown is found in hot countries, and could not live in the Arctic regions.

11. The boy is mounting his pony from the wrong side. The correct side from which to mount is the left or near side.

12. The boy is writing with his right hand and the mirror reflects him also writing with his right hand, whereas a mirror should always reverse everything as it reflects it.

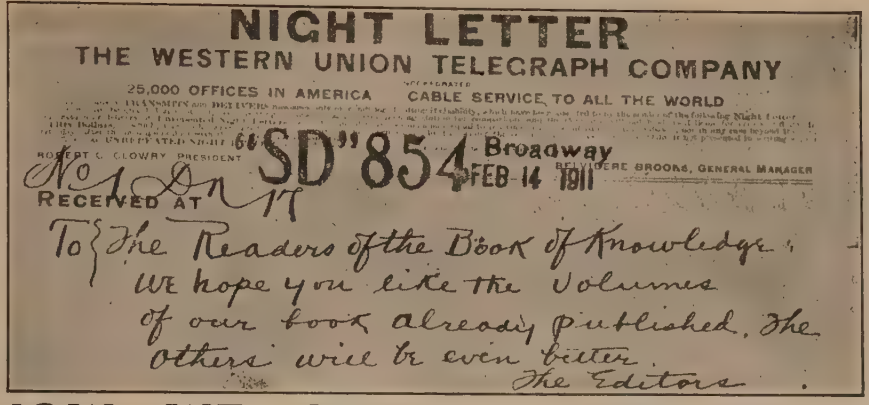
THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 3611

HOW THE SHIPS OF THE BRITISH NAVY ARE

The world is becoming a more wonderful place to live in every day. We can speak to people hundreds of miles away; we can send messages round the world in less than five minutes. In this picture, the artist has tried to show one of the greatest marvels that the mind of man has yet achieved. Upon the dome of the new Admiralty Office in Whitehall is a mysterious entanglement of wires which must have puzzled many passers-by. These wires are part of one of the great wonders of our time; they mean that men can sit in a little room in London and be in touch with ships more than a thousand miles away. It is wireless telegraphy that has made it possible for men thus to sit under the dome in Whitehall and watch over the British Navy 1,500 miles away, as a shepherd, seated on a hillock, watches over his flock of sheep in the
show us how this is done. Grouped a
studying a map, which shows the Atl
as the British Isles and a part of Eur
shall see that it represents in every p
vessels at sea. Arranged on the ma
the ships themselves are placed at
Cornwall, and at Culver in the Isle of
which a ship can flash a message th
message flashed to them. All thes

WATCHED FROM A TABLE 1,500 MILES AWAY

round him. The artist has tried to table are admirals and naval lords ocean and a part of Canada, as well we look at this map on the table, we r the larger picture map with all the ny models of ships, placed exactly as At Clifden in Ireland, at Poldhu in , are wireless telegraph stations, to e air in a few minutes, or receive a ns are also in communication with London, and their messages, carried by the mysterious electricity in the air, come to the wires we see above the Admiralty tower. From there, the messages are received in the telegraph room, and immediately given to the watchers by the table. Thus, by means of the model ships, the watchers at the Admiralty can tell at any moment exactly where the vessels are at sea, and can instruct their commanders, by flashing messages to them, to hasten home to the island shores in case of danger, or to go to some other part of the far-spread empire. So it may be said that the eyes of the Admiralty see 1,500 miles away, and that the men standing in this room in London can actually command the movements of a naval battle far off in the Atlantic Ocean.


NIGHT LETTER
THE WESTERN UNION TELEGRAPH COMPANY
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To The Readers of the Book of Knowledge:
We hope you like the volumes
of our book already published. The
others will be even better.
The Editors.

HOW WE SEND A TELEGRAM

CONTINUED FROM 3453

NOBODY can say what electricity really is. It is not matter. It cannot be seen, though its effects can; it cannot be smelt or tasted. We call it a fluid because we cannot give it a better name. But though we do not know what it is, we know how to bring it into use, how to create or excite it, how to harness it, and make it our most marvellous and obedient servant; and one of the chief wonders electricity performs for us takes place after we hand a telegram to the clerk of a telegraph office. A telegram is one of the familiar things in our lives which are really so wonderful that no man can quite understand them.

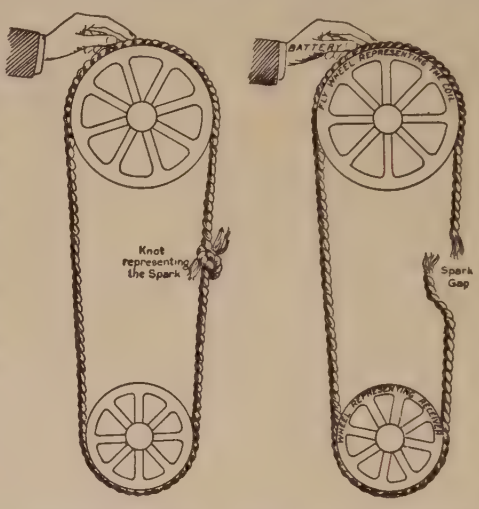
If we wish to send a telegram from Boston to New York, we must have in the first office a battery from which we can send electricity along wires. The wires coil round a piece of iron, and so long as the current of electricity is passing through the coil the iron acts as a magnet—an electro-magnet, as it is called—and draws other metal to it. The moment the current ceases, the iron is no longer a magnet. We see a picture of this electro-magnet and battery on page 3524. When we send the electricity through this coil, we call it magnetising the coil. The current flies swiftly along the wire, and while it is going the circuit is said to be closed. When the current ceases, the circuit is broken.

Taking a Telegram.

Now we hand our telegram for New York to the telegraph operator. Before him there is a little lever with a knob at the end. This lever is called a key. While that key is at rest, the circuit is broken. The moment he presses it down, the circuit is closed, and the current races along the telegraph wire. He taps away at his key, and the message flies over the wire, to be written down at the New York office. How is it done? New York is the receiving end. Well, at the end of the wire, they have an electro-magnet made as we have seen, of wire and iron. This magnet in the receiving office is shown on page 3525. A current comes

from Boston It enters the office by the wire. It passes through the coil and makes the iron magnetic. The magnet attracts towards itself a little metal bar working on a lever, and every time this bar comes down towards the magnet, the end of it taps upon a small screw; then when it goes up again it taps on another screw. Each tap that it makes corresponds with something that the clerk in Boston has done at his end of the wire.

The Boston clerk, as we have seen, presses down a key. That key, when at rest, has its knob raised in the air. There is a wire attached to the key. Now, when the key is pressed down, its under side touches another wire. The pressing down of the key joins these two wires together. That closes the circuit. The joining of the two wires instantly causes a current of electricity to flow from the Boston battery over the wire to New York. The instant that the key is allowed to rise from the wire underneath it, the current is stopped, and the circuit is broken. While the current is flowing, the coil and iron in New York become a magnet, that draws towards itself the small metal bar.



This diagram explains the uses of the battery, coil, and wires in the sending of a telegram. The hand stands for the battery, which provides the energy. The big wheel represents the *coil*, which regulates the electric current to flow as we want it. The rope represents the flow of the *current*, conveying the energy to the small wheel, which stands for the receiving end. The knot is for the *electric spark*, which ties the ends of the rope, or current, together, as it were. When the knot is tied, the circuit is closed. When the knot is untied, the circuit is broken. It is the rapid tying and breaking of the spark-knot that produces the electric waves.

Clever men thought out a way of making this of use. They arranged that certain pressures by the sending key should stand for certain letters. We have only to agree once for all that a certain sign shall stand for a certain thing, and then we know what it means. And that is how we got the telegraph's A, B, C. A very short pressure of the key in Boston gives two taps in New York, one very quickly after the other, and a longer pressure gives two taps, but with a longer interval between them. These double tappings, one with a short interval between the taps, and the other with a longer pause, correspond with the dots and dashes of the Morse alphabet, which we see on the opposite page, and with which you can make words yourself.

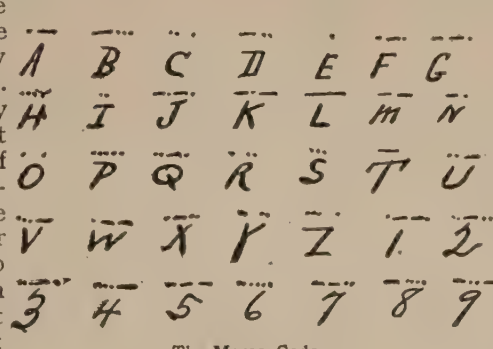
When we send our telegram from Boston to New York, the operator turns the letters which we have written into telegraphic letters by tapping away at his key in the manner agreed upon. Each tap is registered in New York as it is made. With each pressure upon the key the circuit is closed, and the current flies for a certain length of time, signifying a sign which means part of a letter. Each time the key is at rest in its ordinary position, the current ceases to flow.

But there is a limit to the speed at which a man can tap his key. If he is very skilful and strong he may be able to send as many as forty words a minute. More likely he will not be able to send more than twenty-five. That is not quick enough when the message which he sends, instead of being a little telegram from one of ourselves, is a long one of thousands of words—a speech, or the account of some great event. For this, another system is used. A message of twelve hundred words, for instance, would be divided among, say, ten clerks, each of whom sits before a machine that punches holes in a ribbon of paper, the holes corresponding to the letters of the Morse alphabet. Each clerk punches 120 words of the message, at the rate of 25 words a minute, so that, when the work is divided in this way, the whole message is punched out on the tape, or ribbon, in about five minutes. The ribbon is then run through an elaborate telegraph instrument, called an automatic transmitter, because it works itself. The ribbon runs through in such a manner that the

circuit is closed at each hole in the paper representing a dot or a dash, and the current flows along the line, to be registered at the other end, in ink, upon a tape. By this machine, messages can be sent at the rate of 400 words a minute. The recording of the dots and dashes upon a tape at the receiving end is necessary, because no clerk could write out the message at the rapid rate at which it is received. The writing out is done from the printed dots and dashes on the receiving tape.

We do not find this recording instrument in the small offices. The instrument which is used in railway signal-boxes and stations is what we call the needle instrument. There we find a little dial, in front of which a needle works to right or left, according as dots or dashes are meant. By watching this, the operator can take a message quite easily. But as the needle moves to right and left it strikes upon two little bars of metal, each different from the other, so that they give out different sounds, and by listening, without watching, the clerk is soon able to read the message by sound, just as the clerks in the other offices do with their improved instruments.

Perhaps the greatest wonder of the telegraph line is the fact that several messages can be sent at the same time. Two messages can be travelling over one wire at the same time from Boston to New York, while two others are coming at the same time over the same wire from New York to Boston. This is done by arranging different strengths of current. The messages that are travelling together from the south to the north are each sent by a current which is of different strength from that of the others, and the same is the case with those coming from the north. Each current goes to a receiver, which takes a current of particular strength.



The Morse Code.

If we have relatives away over the sea to whom we may wish to telegraph, we can reach them by a message carried by electricity under the sea. Cables run under the Atlantic and Pacific Oceans, under the Mediterranean Sea, the Black Sea, the Indian Ocean, the North Sea, the English Channel, and so forth. There are about 250,000 miles of these submarine cables in use, so that we can exchange messages with England, Hawaii, Australia, New Zealand, India, China, and every other civilised country. The principle is the same as in the land telegraph, but the wires are different, and the rate of telegraphing is slower, as the current passing through these long wires is necessarily weaker, which makes the recording of the messages received a slower operation.

If the ordinary telegraph wires were used, the current would run off into the sea and be lost. So the wires have to be encased in gutta-percha, and bound round with tape and yarn, and brass, and tarred hemp, and over all are wound coils of stout wire, to protect the cable from the sea, and the rocks at the bottom of the ocean. For long distances, only one wire is placed inside the cable, but for shorter ones many can be used. More than one message can be sent over the cable at the same time.

The speed at which cablegrams can travel is very great, though we have not yet the instruments to receive the messages quickly. A signal has been sent 8,000 miles under water in a single second. But we could not send a long message at this rate. As it costs a quarter a word to cable across the Atlantic, codes are used by which one word may mean a dozen or more words. By this means, time and money are saved. Once an English firm cabled to their manager in Victoria, British Columbia, and received the answer in a minute and a half. The distance there and back is 18,000 miles.

Not many years ago at an Electrical Exhibition in Chicago, a message was sent from a room, through the United States to Canada, from Canada to London, from London to Portugal, Spain, Egypt,

India, and Japan. It went back by the same route, and was received in the same room from which it had started, but at another instrument. It had been round the world in fifty minutes.

Undoubtedly the most wonderful method of telegraphing is that without wires. We get some idea of how it is done from the story about the telephone, on page 349. It was known for some years that electric waves are carried through the air in all directions, with the speed of light, and this knowledge has been turned to useful purposes.

By the use of an instrument called a transmitter, these electric waves can be sent bounding forth through the air in all directions. By making a receiver in tune with the transmitter, we can make that receiver take a message. To receive the message an instrument called a coherer is used. A coherer is a glass tube, sealed at both ends with metal, and filled with metal filings. When an electric wave comes along, it passes through this tube. It magnetises the metal filings, and causes them to draw close together—to cohere, and to close the circuit. The wave is quickly gone, the filings are no longer magnetised, and the circuit is then broken again.

Delivering a Telegram.

The coherer receives a light tap from a little automatic tapper, and the filings fall apart again instantly, to be as they were before, ready to receive the next electric wave. When the metal filings come together and close the circuit, they operate a bell or sounder, like the simple instrument in the country post-office, and the message which they tick is read and written down, ready to be sent to the person for whom it is intended.

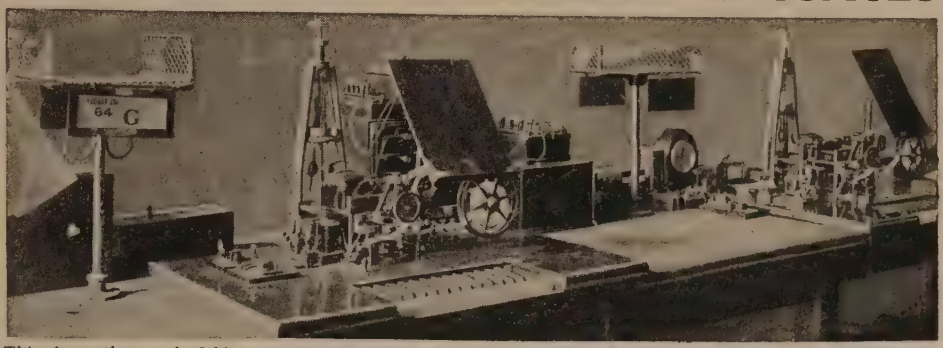
Thus, we send a message thousands of miles across the ocean without the help of wires. Here again the rate is slow. Cablegrams run off at the rate of fifty words a minute, but the wireless telegrams go at the rate of only twenty-five words a minute. Some day, of course, this pace will be greatly improved. Wireless telegraphy is one of the great gifts that inventors have given to mankind, and we cannot yet realise the importance of it to the world. The pictures on these pages show how wonderful is the power that wireless telegraphy gives us to speak across the sea, and only a few months before these words were written there happened a wonderful thing, showing how the power of telegraphy without wires may save great disasters at sea. Let us read the story of how a man tapping away into space saved a thousand lives.

Let us picture to ourselves an immense liner moving slowly from its berth. The quay is crowded with people waving their hands and fluttering handkerchiefs. From the side of the ship, on all the decks, leans a multitude of passengers waving farewell. The space between these two crowds slowly widens. Between ship and shore flows an increasing space of troubled water. The faces of people become indistinct. The sounds die away. Then the engines get to work, and the great ship moves forward, and draws impressively to sea.

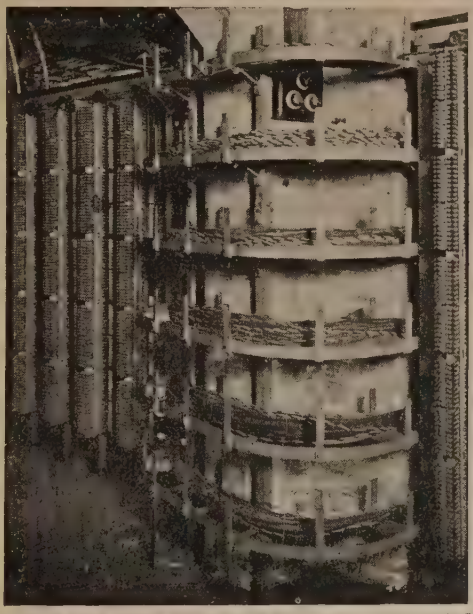
The passengers hurry to their cabins. They see that everything is comfortable for them. They put on great coats and wraps, and take to the decks. Before they begin to walk about, however, they think of their families ashore, their wives, husbands, children, sweethearts. They go to one of the rooms on the ship and write messages of affection and good cheer. They ring a bell. A servant comes, and the messages are handed to him. They are carried to the clerk in charge of the wireless telegraph. The passengers begin to walk about the liner and to enjoy themselves.

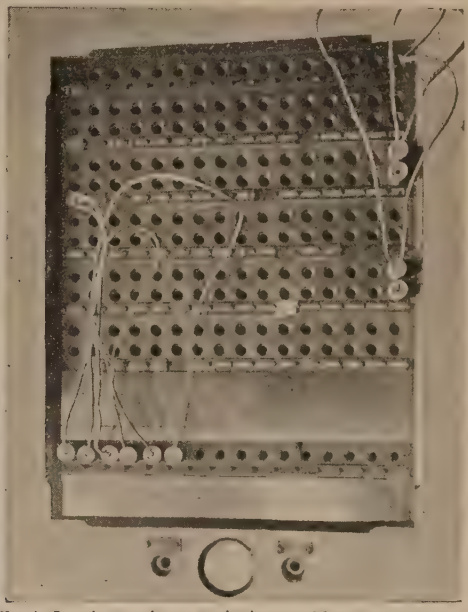
In his little room the clerk of the wireless telegraph sits before his machine. On the table in front of him are the messages of passengers, a pile of crowded papers. It is the business of the clerk to send those messages. He flips an A, B, C into the ether, and somehow or another those letters are

THE CENTRE OF A MILLION MESSAGES

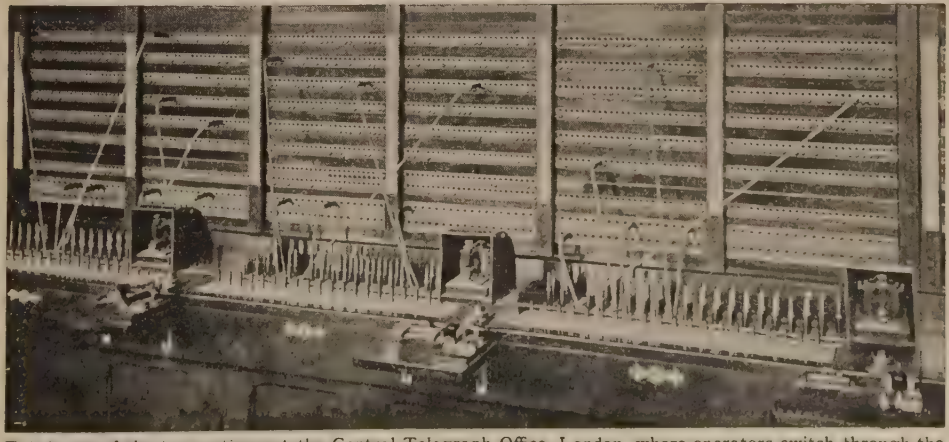


This shows the wonderful instruments by which messages are sent from London to Berlin, at the rate of 40 words a minute. The sending is done by a keyboard like a piano, and the machine prints the words at the other end.





There are about 5,000 wires in the Central Telegraph Office in London, and every wire is tested from time to time to see that it is in working condition. On the left we see the wires all numbered, and on the right is a test-box.



This is one of the ten sections at the Central Telegraph Office, London, where operators switch through the wires connecting up all Greater London. They work at lightning speed, and have a marvellous knowledge.

THE TELEGRAM STARTS ON ITS WAY

In the left corner we see the interior of a telegraph office. Outside we see the wires running across country. The girl is sending a telegram to the office shown on the next page, hundreds of miles away. Each time she presses down the key with her right hand, a current runs from the battery, through the key, which connects the two wires, through the galvanometer, and out over the wires to the far-away town.

received on shore. They travel without wings, without wires; they arrive.

A fog descends upon the sea; the engines are slowed; the foghorn begins to sound.

Tap, tap, says the operator, earning his daily bread.

Crash!

A noise like thunder. A shock that sends everything flying. A tearing and rending and splintering of timbers. A dull, thudding crumple of steel plates. The roar of water rushing in. The staggering shudder of the whole ship. Shrieks and cries of people from every quarter. Voices shouting through the fog—loud voices of command. And darkness. Every electric light goes out.

The operator interrupts a sweetheart's message, and taps out the letters C, Q, D. Through the cries of the passengers, above the shouts of command, piercing the black fog and winging wingless over the ocean, those invisible letters strike on the "receiver" ashore, and on numerous "receivers" aboard other ships, almost at the moment when the operator sets them free. They mean to those who receive them: "In serious trouble, need immediate help."

What has happened? The steamer Florida has rammed the great White Star liner Republic. The water pours in, the pack of panic-stricken humanity waits for death.

Through it all the operator sits amid the ruin of his office, tapping, tapping, tapping his messages into space.

On another vessel, in another little office, another clerk sits tapping away at the ether. The telegraph operator on the Baltic was sending his passengers' messages home when his receiver recorded the distress call from the Republic. The sinking ship was sixty miles away, drifting in a dense fog, and the Baltic changed its course and set out to find it. From half-past seven in the morning till half-past six at night the Baltic scoured the sea, talking all day long to the ship that was sinking with a thousand lives. All day long on the sinking ship sat the telegraph operator,

THE TELEGRAM AT THE OTHER END

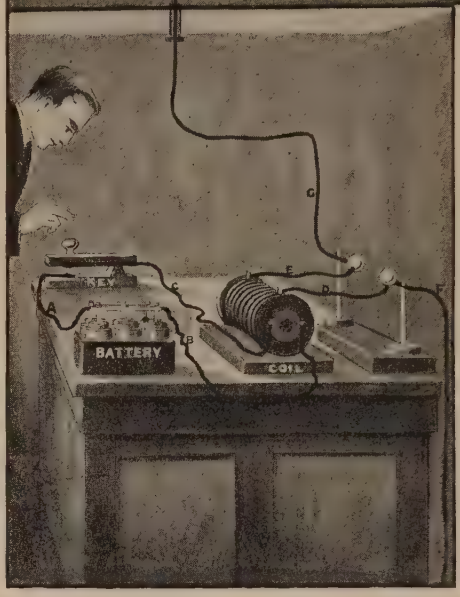
We are sending this telegram by the simple single-wire system, so the clerk has to write down the dots and dashes as they sound. Each shock pulls down the iron marked A, causing the bar to strike the pegs P P and sound the "dots" and "dashes." From the girl, the current passes along the wires, then back through the instrument, into the earth. When the man telegraphs, the current goes into the earth and back along the wires to the girl.

tapping into space a signal of distress. Let us try to imagine the scene. Two ships are in peril in a thick fog. Two thousand men, women, and children prepare to die. In a little room on one of them, a man is tapping at a keyboard, tapping into space a bitter cry for help. The air-waves, set in motion by his tapping, travel sixty miles until they find, on another ship, a sympathetic disc on which they register themselves; and below, in the operator's room on this other ship, the tapping is repeated, and the ship's distress made known.

Two other ships pick up the silent cry that trembles through the fog, and, all day long, three vessels pursue the sinking ship, with which they keep in touch by constant tapping, by telephone bells at the bottom of the sea, and by communication with telegraph stations on land. It is a thrilling thing to think of, these ships drifting in the fog, talking to each other over sixty miles of space, carrying along an invisible ocean new life for two thousand beating hearts. "We are sinking rapidly," says one message. "We can hear a bomb to the west of us; is it yours?" says another. The Lucania asks the Baltic to "please listen for four blasts." Another ship asks the Baltic to "make as much noise as possible." The captain of the Republic thinks he hears a steamer's whistle, and appeals to the Baltic to hurry, for his ship is "sinking fast."

And then at last, after a whole day's search, steering and zigzagging for 200 miles, the Baltic received the message from the sinking ship: "You are very close now; right a-beam. Come carefully. You are on our port side. Have just seen your rocket. You are very close to us." They were within 100 feet, and saw the faint glare of a green light, and in twelve hours the sinking ships were emptied of their living freight.

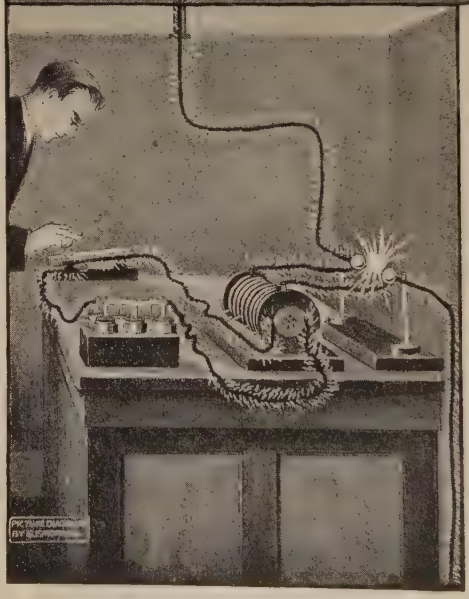
Only a few years ago the Republic must have been completely lost, and that catastrophe was saved a few months ago, for the first time in the history of the world, by wireless telegraphy, a power which no man understands.



THE OPERATOR READY TO SEND A MESSAGE

SENDING A "WIRELESS" TELEGRAM

Here we see the operator preparing to send a telegram without wires. There is the key, which he is to tap; the battery, which gives the current necessary for sending the message, and the induction coil. At a little distance from the coil we see two brass knobs. One of the knobs is connected to a wire, F, which runs down into the earth. The other knob is connected to a wire, G, which goes out into the air. So long as the key remains untapped, that is to say, so long as the ends of the wires have a little space of air between them, just underneath the knob, the current cannot flow along the wires. The telegraph instrument, without the touch of the operator's hand, is as silent as an unplayed piano. But a message has to be sent. The operator presses the knob. The current leaps from wire A to wire C, along this to the coil, and back wire B to the battery, causing another current, much stronger, in another part of the coil, which pushes its way out along wire D and E to the brass knobs.

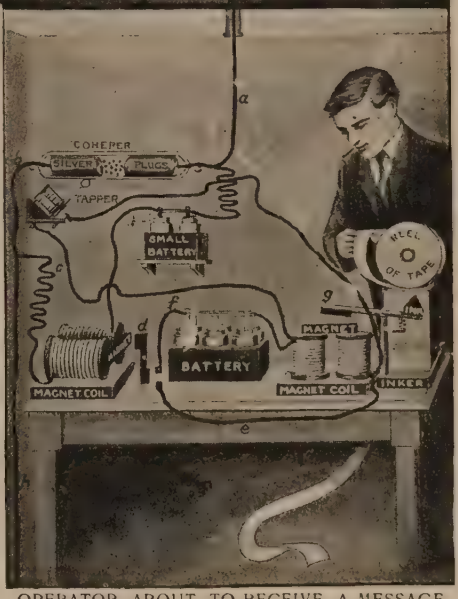


MAKING THE ELECTRIC CIRCUIT

The current from E charges the little brass knob powerfully with electric energy; the other knob is also charged from the coil along D; the electric charge gathers in the knobs until it becomes so powerful that the air between them is unable to keep it apart, and it leaps across the space with a loud crack and brilliant spark; this sends a shock along the wire F down into the earth, and also up the wire G out into space in every direction, as we see on page 3531. The electric current is shown as sparks of light in this picture, but it cannot really be seen. For a dot of the alphabet a single spark jumps from knob to knob. For a dash there is a little stream of sparks. What else happens we cannot see, but we know all the same. When the key is tapped and the spark ends, the message actually begins. Waves are set up in the ether, carrying each dot and dash of our message. Such is the power of electricity working in conjunction with the wonderful ether, an element that not one of us can explain any more than we can explain the electricity itself.

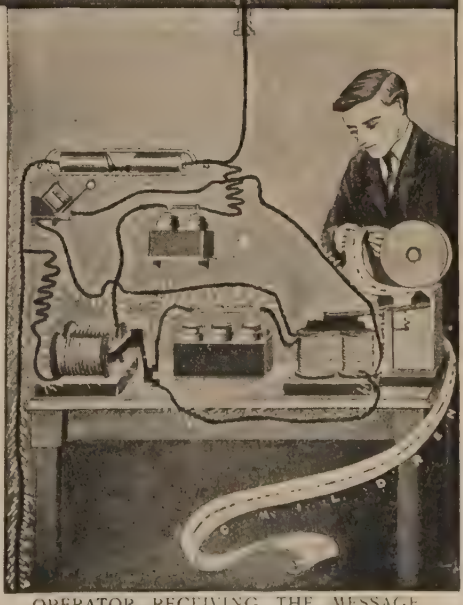
RECEIVING A "WIRELESS" TELEGRAM

Here is the office in which the wireless telegram is to be received. The sender, whom we see on the opposite page, may be thousands of miles away, but the receiving instruments here are in tune with his. The waves which he caused, after travelling for thousands of miles over the ocean, at last reach, in about one-sixtieth of a second, the wire *a*. Through this they pass to the coherer, shown large in this picture for clearness. It is a little glass tube, in which are two silver plugs. Between these there is a little space, which is occupied by loose grains of nickel and silver. The incoming wave causes the filings to cohere, or join together, as we see in the lower picture. The message through *a* now flies across, and through *b* and *c* to the magnet coil. It magnetises the piece of iron marked *magnet*, which attracts the upright piece *d*, and this enables the message to pass to the wires *e* and *f*, which now form a powerful circuit, working another magnet, which also pulls down another piece of iron, marked *g*.



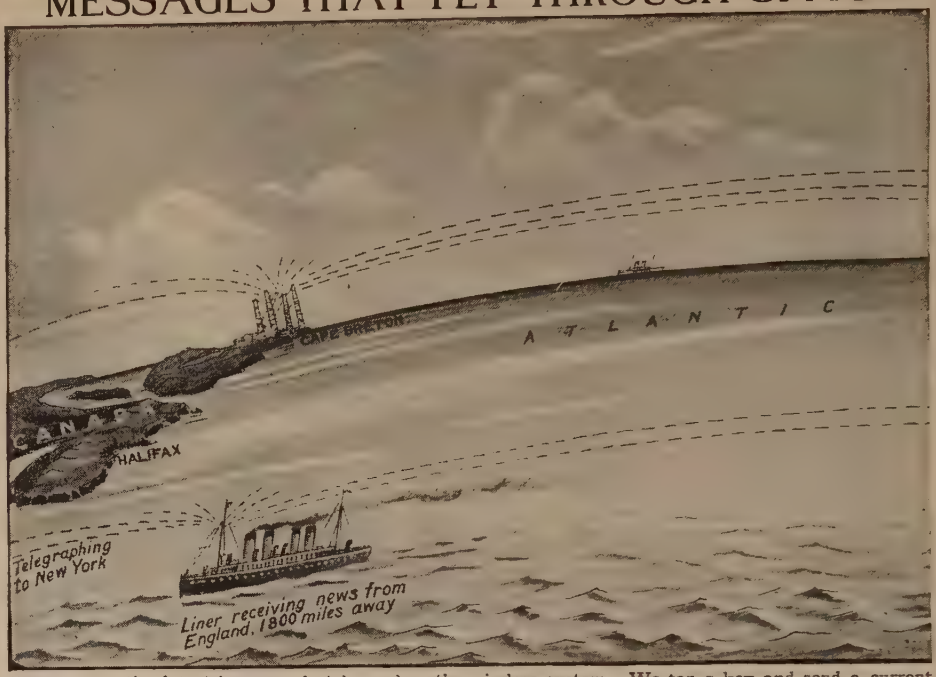
OPERATOR ABOUT TO RECEIVE A MESSAGE

Every time the piece of iron marked *g* is attracted by the magnet, it tilts up an inker at the other end, which spells out the message in dots and dashes on a tape, revolving on a wheel by clockwork. This lower picture shows the signs that spell CHILDREN'S ENCYCLOPÆDIA being inked on to the coil. The circuit must be broken several times for each word—after each dot or dash—otherwise we could not get our message. This is effected by the little instrument placed just under the coherer, marked "tapper." Directly the filings cohere, the tapper gives it a tap, as shown in the upper picture, and the filings separate, ready to be drawn together by the next electric shock received. The wire *h* is run down into the earth, the great body of which completes the circuit of perhaps 5,000 miles. The simplest forms of instruments are shown on these pages, but for long-distance messages more elaborate instruments, with a powerful dynamo instead of a battery, would be used to form a circuit through the ether in the earth.

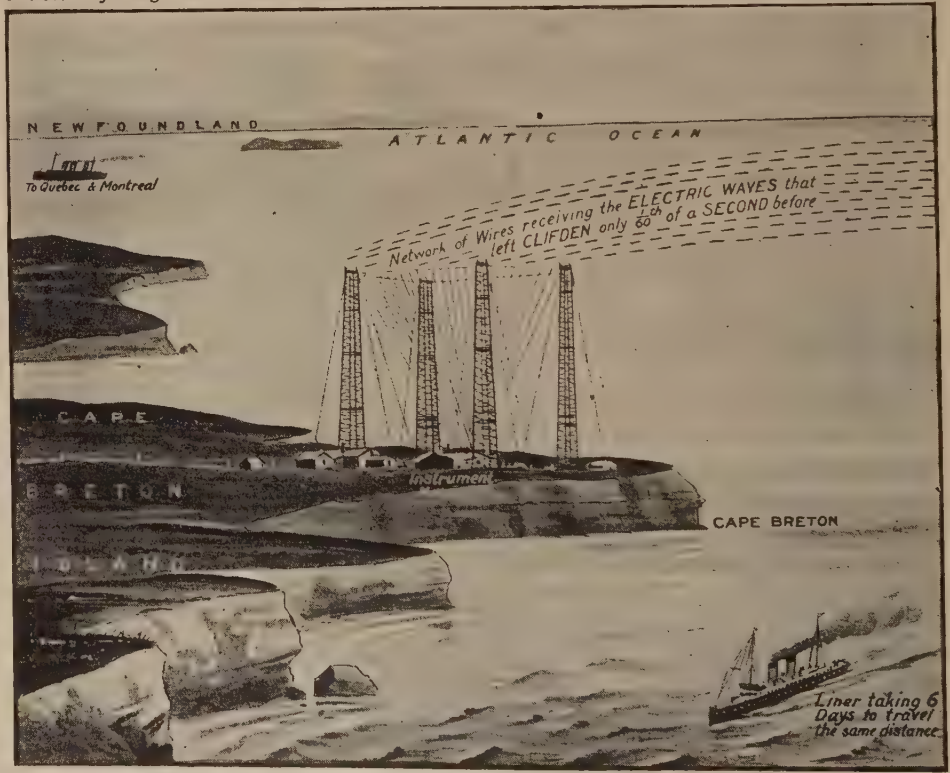


OPERATOR RECEIVING THE MESSAGE

MESSAGES THAT FLY THROUGH SPACE

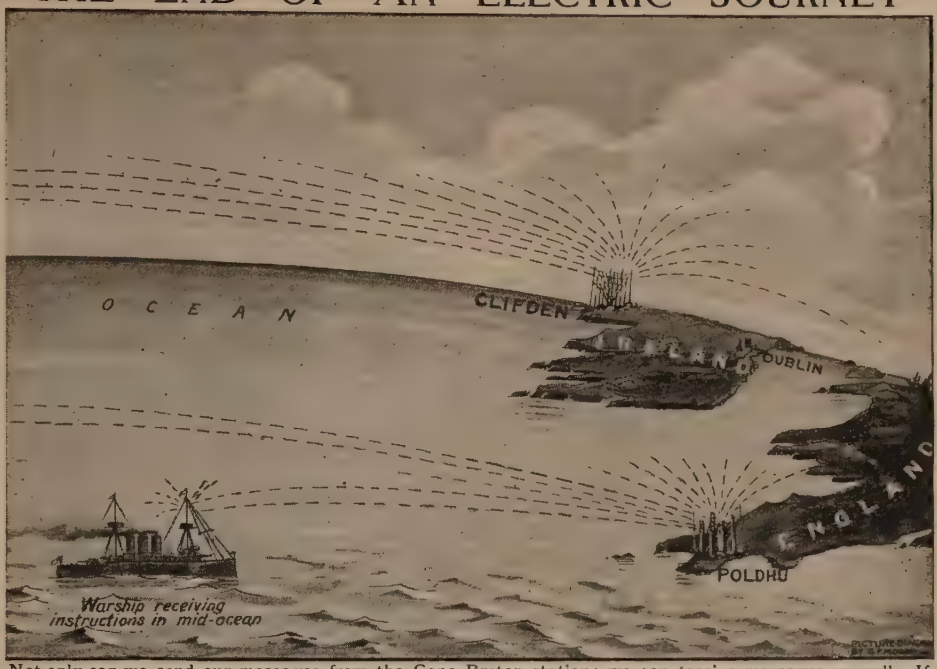


Here we see the latest invention in telegraphy—the wireless system. We tap a key and send a current of electricity along a wire. From the end of this wire the current springs into space and flashes across the sea.

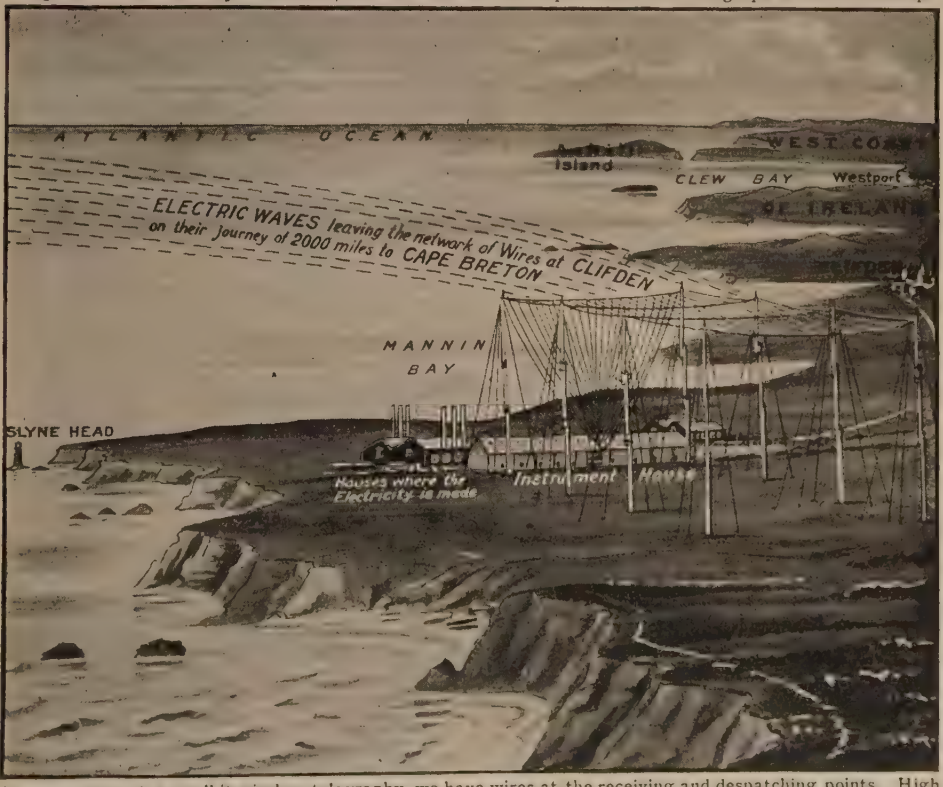

NEWFOUNDLAND
ATLANTIC OCEAN
To Quebec & Montreal
Network of Wires receiving the ELECTRIC WAVES that left CLIFDEN only 60th of a SECOND before
CAPE
BRETON
Instrument
CAPE BRETON
Liner taking 6 Days to travel the same distance

If we want to send a wireless message from Cape Breton to Ireland, on the other side of the Atlantic Ocean, we tap our key, and the message flies through the air, covering the 2,000 miles journey in the sixtieth of a second.

THE END OF AN ELECTRIC JOURNEY



Not only can we send our messages from the Cape Breton station; we can receive messages as well. If we get news for somebody on the sea, we can receive it at Cape Breton and telegraph it out to the ship.



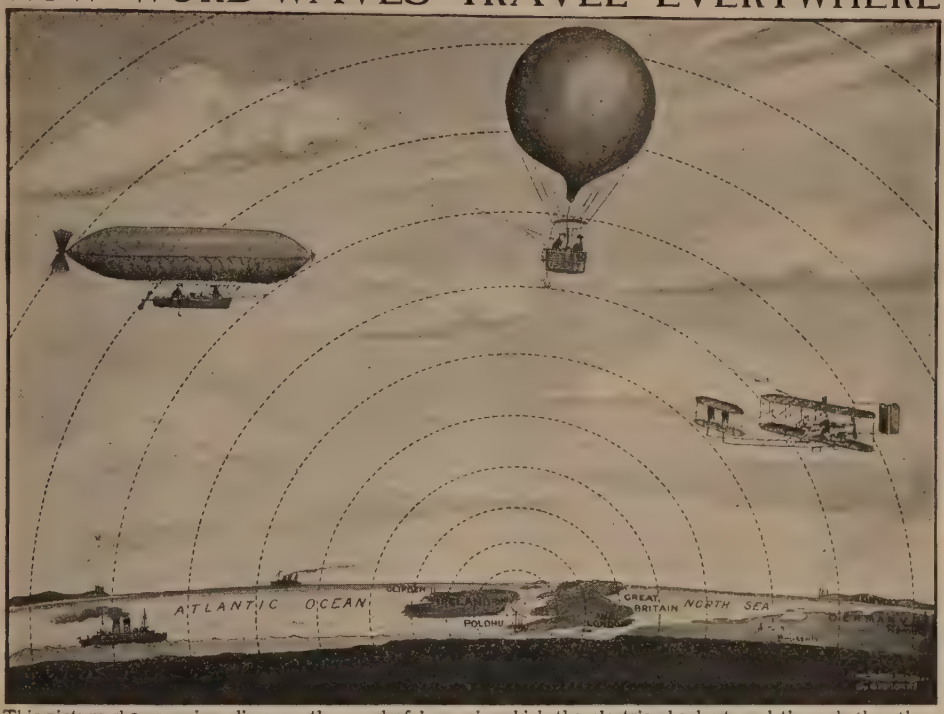
Of course, though we call it wireless telegraphy, we have wires at the receiving and despatching points. High posts are erected at the instrument houses to catch the waves as they fly to us from those who send the message.

A WIRELESS STATION BY DAY AND NIGHT

The structures, with the wires at the top, are built high so that the electric waves, when starting across the sea, may not meet with obstructions. On striking the ocean they leap from crest to crest of the sea-waves.

This picture gives us a glimpse of a wireless telegraphy station by night. Whether it be light or dark, the wonderful waves created by the power of electricity speed on their way across the waters. Receiving instruments are ready to record their message, and the words fly, in dots and dashes, speedy as light, and as noiseless.

HOW WORD-WAVES TRAVEL EVERYWHERE

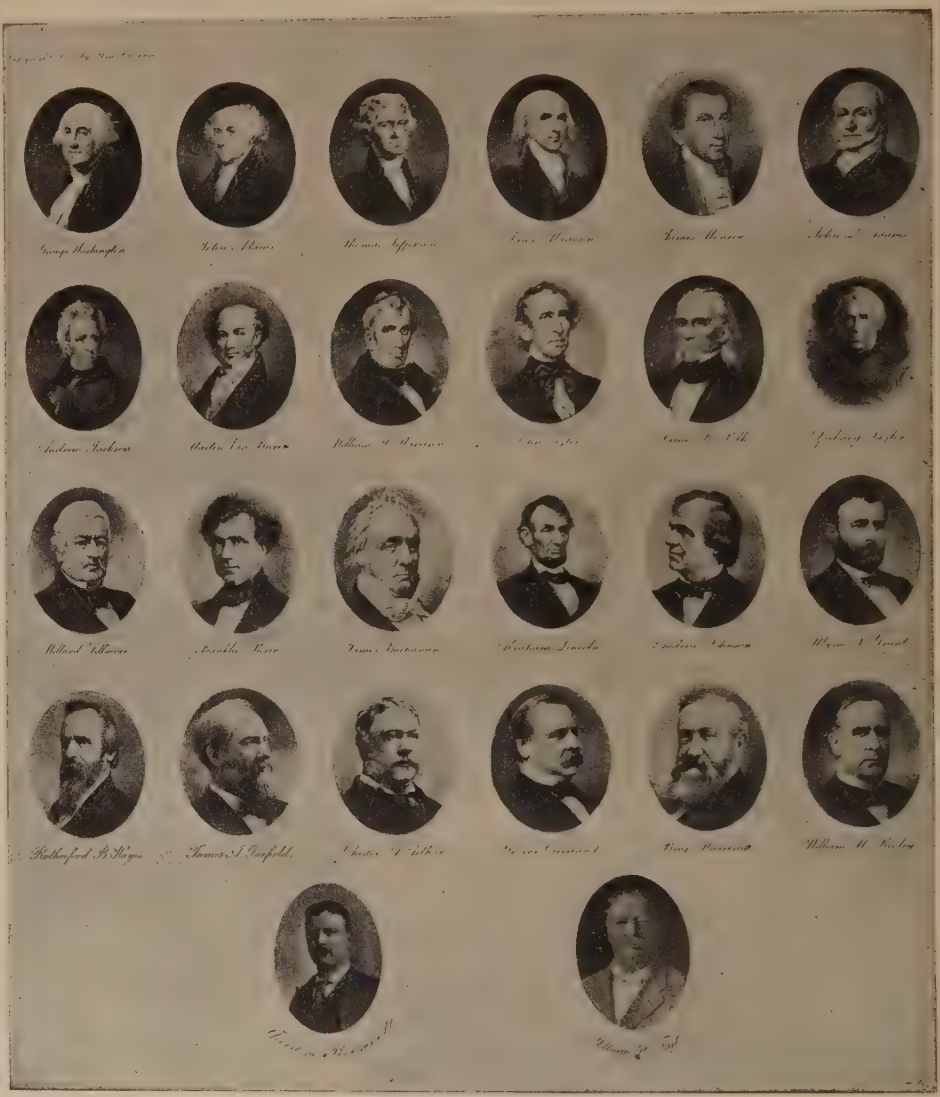


This picture shows us in a diagram the wonderful way in which the electric shocks travel through the ether. The wireless waves radiate in all directions, outwards and upwards, so that in less than one-sixtieth of a second a dot of the message, shown here as being sent from Poldhu, could be received in London, Norway, Berlin, America, or on any ship sailing on the Atlantic Ocean. It is to prevent everyone receiving everyone else's messages that the instruments are tuned. The message could also be received in airship, aeroplane, or balloon at thousands of miles above the clouds if men could get there. It is also believed that they descend into the earth.

This picture shows us, in another way, what we see above—how the wireless waves radiate, expanding evenly in true circles. The boy has thrown a stone into the river, and the waves flow outwards, getting fainter and fainter the farther they get from the spot where the shock occurred. The wireless waves are waves in the ether very like these water-waves, with this difference, that while the ripples of water travel only in a horizontal direction all round, and at a slow rate, the wireless waves travel at a very rapid pace, and in all directions. A better illustration of how these electric waves travel is provided by the light from a lamp or candle. The light-waves move from the flame in every direction, and the wireless waves travel through the world in exactly the same way from the centre at which the message is sent off.

THE NEXT FAMILIAR THINGS ARE ON PAGE 3649

PRESIDENTS OF THE UNITED STATES



Here are the twenty-six men who have held the great office of President of the United States since the beginning of the government in 1789. Under them the population has grown from about four million to more than ninety million, and the nation has become one of the strongest and wealthiest in the world. No king or emperor has more power than the President, but at the end of his term, or terms, he becomes a private citizen again, with no more rights than any other. While there is no law to prevent a man being continued in his office for life, it has grown to be the custom to elect no man for more than two terms of four years each, and only nine of the twenty-six had a second election Five succeeded to the office by the death of the President. These were Tyler, Fillmore, Johnson, Arthur and Roosevelt. The last named is the only one who was then elected for a term of his own. Up to this time all our Presidents have been born east of the Mississippi River, in the older states. Fifteen have been elected from three states, Virginia, New York and Ohio, and three lived in Tennessee at the time they were elected, though it is a curious fact that all of them were born in North Carolina. The census just taken shows such a wonderful growth of population and wealth in the West, that we need not be surprised to see a President elected from that region, which was almost uninhabited sixty or seventy years ago. On page 2419 you may learn more about our Presidents and the states from which they came.

By courtesy of William Clausen, New York.

WHAT WE LEARN IN THIS ARTICLE

IN other volumes of our book you learn the history of our land from the beginning, but there was so much to tell that we could not mention every event. Here you are given a list of the Presidents of the United States and are told the most important events which occurred during the term or terms of each of them. You will find it a very convenient storehouse of facts.

ADMINISTRATIONS OF THE PRESIDENTS

GEORGE WASHINGTON, First President. (Two terms, 1789–1797)

With the adoption of the Constitution and the organisation of a Republic came the election of the first president of the United States, George Washington. He served two terms,—from 1789 to 1793 and from 1793 to 1797,—but refused a third term of office. His administrations were periods of growth for the new nation, and the wisdom of President Washington kept peace throughout the land. During his first term of office, the United States arranged the national debt, thus establishing their credit among the nations of the world; and we adopted the decimal money system of dollars, dimes and cents.

The prosperity of the country was greatly increased by the invention of the cotton gin by Eli Whitney; its area was enlarged by Jay's treaty with England, and by a treaty with Spain; and the number of states in the Union was increased to sixteen, by the addition of Vermont (1791), Kentucky (1792), and Tennessee (1796).

JOHN ADAMS, Federalist. Second President. (One term, 1797–1801)

In 1797 John Adams of Massachusetts, who had been Vice-President under Washington, became President of the United States. During Washington's administration, the French had asked our assistance in their war against England, and now, in Adams' administration, the corrupt government of France threatened to fight us unless we bribed them with money, "plenty of money." A wave of indignation swept over the United States. Pinckney, our minister to France at that time, spoke for the nation: "Millions for defence," he said firmly, "but not one cent for tribute." Soon a short and irregular war opened between our country and France, the United States capturing two or three French battleships, but as soon as the French discovered that we were going to give them "plenty of bullets" instead of "plenty of money," they came to terms of peace.

Adams' administration was rather an unfortunate one for him, as, owing to the trouble occasioned by foreigners who tried to stir up American citizens to help them in their war against England, Congress passed two new laws called the Alien and Sedition Laws, providing punishment for foreigners who were bent upon mischief, and for all persons who spoke or wrote against the government. These laws were short-lived, and although it was never necessary to put the first into effect, yet they made President Adams so unpopular that when his term expired, he was not re-elected.

THOMAS JEFFERSON, Republican. Third President. (Two terms, 1801–1809)

Upon Adams' retirement, his Vice-President, Thomas Jefferson, was elected and served for two terms,—from 1801 to 1805, and from 1805 to 1809.

His administration was an eventful and prosperous one for our country. The pirates of Algiers and Tripoli, who for years had demanded tribute from

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our vessels, were completely subdued by our warships, so that we were troubled by them only once afterwards. In 1803 an immense tract of land, more than doubling the area of the United States, was obtained for us from France through the Louisiana Purchase, and was partly explored by Lewis and Clarke in 1804–05. In 1807 the first successful steamship, invented by Robert Fulton, sailed up the Hudson River. Ohio was also admitted to the Union in 1803.

JAMES MADISON, Republican. Fourth President. (Two terms, 1809–1817)

James Madison was elected fourth president of the United States, and served two terms, but his administrations were stormy, owing to Indian troubles and to the fact that in 1812 the United States declared war against the English for stopping our ships on the high seas and taking from them sailors supposed to be of English birth. We were badly beaten on land, Washington was captured, the Capitol and the White House were burned, but we swept everything before us at sea. The last battle of the war was fought January 8, 1815, at New Orleans, where the British were completely put to rout, though a treaty of peace had already been signed, but the news had not reached America. This War of 1812 was, on the whole, a fortunate one, as it thoroughly established our rights upon the seas and forced the respect of all the European powers for the new country growing up in the West. During Madison's administration two new States, Louisiana (1812) and Indiana (1816), were added to the Union.

JAMES MONROE, Fifth President. (Two terms, 1817–1825)

Our fifth president, James Monroe, had fought in the Revolution and had arranged the purchase of Louisiana, but he came to his administration when the peace of the War of 1812 had just been made, and in the following years the young republic advanced by leaps and bounds. Florida was purchased from Spain and made a territory of the United States; five new states, — Mississippi (1817), Illinois (1818), Alabama (1819), Maine (1820), and Missouri (1821), were added to the Union; a national road was built across the Alleghany Mountains to the Mississippi, and the people poured over the Alleghanies into the rich bottom lands in the Mississippi Valley. The "Monroe Doctrine," forbidding the further colonisation of North and South America by European powers, also came into existence during this administration.

During Monroe's first administration party feeling died down, and no candidate opposed him at the election in 1820. One elector, however, refused to vote for him, saying that no man except Washington should receive every vote.

In 1824, during Monroe's second term of office, we welcomed to our shores again the brave Frenchman, Lafayette, who had so loyally supported us in the terrible years of our Revolution.

He was greeted with tears of joy by his comrades of the war, and shouts of welcome by the people. Congress made him a rich gift of money in gratitude for his services, and when he returned to France, we sent him home in one of the finest warships of our navy.

JOHN QUINCY ADAMS. Sixth President. (One term, 1825–1829)

While John Quincy Adams was president the Erie Canal from Albany, on the Hudson River, to Buffalo, on Lake Erie, was completed (1825), making travel to the West far cheaper and easier in every way. It also helped in building up cities and towns in the western part of New York State. A few years later, in 1830, the first railroad was built in the United States, and soon little engines drew coach-loads of passengers from one portion of the country to another, at a rate of speed which would be truly astonishing to the modern boy and girl, used to seeing the trees and telegraph poles spin by at the rate of fifty miles an hour. To-day the railroads of the United States would stretch several times about the globe. John Quincy Adams served but one term of office, and was not at all popular. During his administration, in 1826, the first American Temperance Society was formed.

ANDREW JACKSON, Democrat. Seventh President. (Two terms, 1829–1837)

Andrew Jackson was one of the most truly beloved presidents of the United

States. He was elected in 1828 and served two terms of office. Not long after his inauguration a newspaper came into existence under the editorship of a young man named William Lloyd Garrison. It was called "The Liberator," and was in favour of freedom for the slaves in the South. This was thought a wild idea at the time and created a great stir of excitement through the country. About this time South Carolina, under the leadership of John C. Calhoun, objected to a law passed by Congress increasing the tax on all cotton and woollen goods imported from abroad, as the Southerners said they could clothe their slaves much cheaper on imported material than on material sold by manufacturers in the North. The people became so heated over the matter that war between South Carolina and the Union was only prevented by the firmness of President Jackson and by the wisdom of Henry Clay, who persuaded Congress to make the tax much lighter. The most of the Indians were removed to lands across the Mississippi River, but in some cases resisted by force. President Jackson opposed the United States Bank and helped to destroy it. During General Jackson's administration two new states were added to the Union, Arkansas (1836) and Michigan (1837), making twenty-six in all, thus doubling the number of the original thirteen states.

MARTIN VAN BUREN, Democrat. Eighth President. (One term, 1837–1841)

Shortly after the election of President Van Buren, the wonderful progress of our young nation was interrupted for a space by hard times and money difficulties throughout the country. Immigrants began to crowd in from Europe, and labour became so cheap that for a time people found it hard to earn a living. But in the long run, however, the country was benefited by this influx of new blood. Towns were built up in the West, railroads started and great coal mines opened with the help of these labouring men from abroad, and gradually they became part of the big new land in which they had come to make their homes.

WILLIAM HENRY HARRISON, Whig, Ninth President, and JOHN TYLER, Tenth President. (One term, 1841–1845)

President Van Buren only served one term and was followed by General Harrison, who had won the memorable victory over the Indians at Tippecanoe. His services had not been forgotten by the American people. With shouts and songs of "Tippecanoe and Tyler too," he was elected to the office of chief executive in 1840. But he lived only a few weeks to enjoy his position of honour, and John Tyler of Virginia, his vice-president, succeeded him in office. Times once more became prosperous under Tyler. The first telegraph instrument was invented by Professor Morse and a line constructed from Washington to Baltimore in 1844. Since then telegraph lines have been constructed over all the known world. During the last months of Tyler's administration a treaty annexing Texas was signed, but it was not admitted as a state until Polk's administration. Florida, however, was admitted the day before Tyler went out of office.

JAMES K. POLK, Democrat. Eleventh President. (One term, 1845–1849)

James K. Polk, who served one term, came to this office in 1845, when the whole country was ringing with the cry, "Give us Oregon, or we will fight," for Great Britain claimed a part of that region, and for a while the two nations nearly came to blows over the matter. Finally it was settled by an agreement dividing Pacific territory between them.

In that same year, 1846, we declared war with Mexico over a strip of land which both that country and the State of Texas claimed to own. Every battle fought in the war we gained, and when the war closed a large tract of land was given us by Mexico, including California, Utah, Nevada and parts of New Mexico, Arizona, Colorado and Wyoming.

During Polk's administration three new states, Texas (1845), Iowa (1846), and Wisconsin (1848), joined the Union, making thirty States in all. Just before the War with Mexico closed, gold was discovered in California and there was a mad rush to the West, thus rapidly settling that part of the Pacific Coast.

ZACHARY TAYLOR, Whig, Twelfth President, and MILLARD FILLMORE, Whig, Thirteenth President. (One term, 1849-1853)

In 1848 General Taylor was elected our twelfth president and not long after his inauguration, California asked to come into the Union as a free state. The South, under the leadership of Calhoun, bitterly opposed this, wishing it to enter as a slave state. For some time Congress disputed the matter, but finally, after President Taylor had died, and Fillmore, his vice-president, had succeeded him, a plan of compromise proposed by Henry Clay was accepted, whereby in 1850 California was admitted as a free state, while the people of the territory given us by Mexico were to be allowed to choose for themselves whether they desired to come into the Union as free or slave states, and the slave trade was forbidden in the District of Columbia. Also a new Fugitive Slave Law was passed by Congress enabling slave holders to catch their runaway slaves in the North.

FRANKLIN PIERCE, Democrat. Fourteenth President. (One term, 1853-1857)

Our fourteenth president, Franklin Pierce, was inaugurated in 1853, and during his term of office the dispute between the North and South upon the slave question became more bitter than ever. Stephen A. Douglas, the wonderful orator of the West, persuaded Congress to make two territories of Kansas and Nebraska, giving them the right to choose whether they would have slaves or not. Immigrants from the North into Kansas wished to have it free; immigrants from the South determined to own slaves, and the result was that Kansas became a battlefield, with the two parties ready to fly at each other's throats on sight. So long and so disgraceful was the feud that the new territory became known as "Bleeding Kansas." Some territory known as the Gadsden Purchase was bought from Mexico and a treaty opening Japan to trade was also an important event of this administration.

JAMES BUCHANAN, Democrat. Fifteenth President. (One term, 1857-1861)

With the coming of James Buchanan to the presidency in 1857, the discussion over slavery became more bitter. Many states in the North refused to return runaway slaves and in fact helped to hide them and to send them to Canada. John Brown, who had been protesting against slavery in Kansas, made a raid upon Harper's Ferry, Virginia, captured the arsenal, which is a storehouse for guns, and attempted to excite the slaves to rise and kill the whites. He was captured, tried and hanged by the State of Virginia.

Three states, Minnesota (1858), Oregon (1859), and Kansas (1861), were admitted to the Union during this administration.

ABRAHAM LINCOLN, Republican, Sixteenth President, and ANDREW JOHNSON, Republican, Seventeenth President. (Two terms, 1861-1869)

In November, 1860, Abraham Lincoln, the Republican candidate, was elected the sixteenth president of the United States, and soon South Carolina seceded from the Union. Before Lincoln had been inaugurated Mississippi, Georgia, Florida, Alabama, Louisiana and Texas had followed her lead. When Lincoln came into office, in 1861, the country was ready for war, and action opened with the capture of Fort Sumter, April 14, 1861, by the Southerners. President Lincoln at once called for 75,000 men, and Virginia, Arkansas, Tennessee and North Carolina seceded.

The story of the war is told in another part of our book. It was practically ended by the surrender of the army of General Robert E. Lee at Appomattox, April 9, 1865. A few days later (April 14) all were shocked to hear that the President had been fatally wounded by John Wilkes Booth. West Virginia (1863) and Nevada (1864) became states.

Vice-President Andrew Johnson at once became president. He was not a popular man and in 1868 a number of the members of Congress attempted to remove him from office, but they did not succeed. After enduring several years of bad government the Southern States were received back into the Union and were once more allowed to send members to Congress. The freed negroes also were given the right to vote. The Alaskan territory was purchased by us from Russia for $7,200,000, thus adding a vast area to the United States;

and in the same year Nebraska entered the Union (1867).

ULYSSES S. GRANT, Republican. Eighteenth President. (Two terms, 1869–1877)

When Johnson's term expired he was replaced in the presidency by the man who had led the Union troops to victory during the Civil War, General Ulysses S. Grant. He was inaugurated in 1869, as the eighteenth president of the United States. While Grant was president the first railroad running across the continent to the Pacific was completed, in 1869, and thousands travelled over its lines to settle in the great West. Three other events of public interest during Grant's administration were serious Indian troubles, including the massacre of General Custer and his men; the admission of Colorado to the Union (1876), and the holding of a World's Fair at Philadelphia in 1876 to show the wonderful growth of our young nation during the first hundred years of its existence.

RUTHERFORD B. HAYES, Republican. Nineteenth President. (One term, 1877-1881)

The first disputed election for president in our history occurred in 1876. So close was the contest between Samuel J. Tilden, the Democratic candidate, and Mr. Hayes that a special body, known as the Electoral Commission, was appointed to settle the matter. It decided in favour of Mr. Hayes.

There were but two events of national importance that occurred during the administration of our nineteenth president, namely, the recall of the Union troops placed through the South, and the dredging of the Mississippi River clean of the mud that lay thick and deep in its broad mouth. This latter was of great advantage to the city of New Orleans, as it now enabled vessels to pass in and out of the river without trouble, and thus greatly assisted commerce.

JAMES A. GARFIELD, Republican, Twentieth President, and CHESTER A. ARTHUR, Twenty-First President. (One term, 1881–1885)

We now come to James A. Garfield, who was elected in 1880. He had been in office but a few months when a man to whom he had refused to give a position in the government, shot him down in the railway station at Washington. Two months later he died and Vice-President Arthur became our twenty-first president. The terrible death of President Garfield turned the attention of the people to the regulation of government positions, and a law was passed taking many appointments out of the hands of the chief executive and compelling those trying to get government work to pass an examination first, thus protecting the president from private requests for places. President Arthur's administration, coming as it did some years after the Civil War, was one of great prosperity. Cotton industries, manufactures of all kinds and the opening of great iron mines throughout the country were among the "signs of the times." Postage on letters was reduced from three cents to two cents in 1883.

GROVER CLEVELAND, Democrat. Twenty-second President. (One term, 1885–1889)

Grover Cleveland came to the presidency in 1885, as the twenty-second president. Two laws of the greatest importance were passed during his administration, namely: one regulating the counting of votes in the election of a president and another providing for the filling of the presidential chair in case of the death of both the president and vice-president. In 1886 the beautiful Statue of Liberty in New York Harbour was presented to the country by the French in token of the good will they felt toward our nation. Any night it may be seen, its flaming electric torch on high, guiding vessels coming up the harbour to the great metropolis of the "land of religious and personal freedom." A severe earthquake which did much damage in the South occurred in 1886.

BENJAMIN HARRISON, Republican. Twenty-third President. (One term, 1889–1893)

With President Benjamin Harrison coming into office, the territory of Oklahoma was opened to white settlers in 1889. During 1889 Montana, Washington, North and South Dakota entered the Union, and Idaho and Wyoming were admitted the next year. With this marvellous growth of our nation, it was decided that we should enlarge our navy, so the United States built a number of steel warships, naming them after some of the states of the Union. Serious

labour troubles also caused much loss of life.

GROVER CLEVELAND, Democrat. (One term, 1893-1897.)

In 1893, very shortly after the second election of Grover Cleveland, a great World's Fair was opened in Chicago to celebrate the discovery of America by Columbus four hundred and one years before. About this time also there arose a dispute between England and the United States regarding the boundary between Venezuela and British Guiana, and for a time war was threatened. The matter was, however, referred to arbitration; that is, wise men were appointed to decide the matter, and there was no war. Before Cleveland retired from office another state, Utah, was added to the Union in 1896, so that the stars in our flag now numbered forty-five.

WILLIAM McKINLEY, Republican, Twenty-fourth President. THEODORE ROOSEVELT, Republican, Twenty-fifth President. (Two terms, 1897-1905)

In President McKinley's administration the country was again plunged into war. Spain had been treating the people in Cuba in a most heartless way, and in consequence a war broke out between Spain and her possession. So many Cubans died a terrible death from starvation, and as Cuba, being really a part of the American continents, came under the Monroe Doctrine, the United States stepped in and said that Spain should not oppress her colony. We sent the battleship Maine down to Havana to inquire into the conditions. While lying in the harbour of that city she was blown up and many of her officers and sailors were killed. The Spaniards were suspected of the act. President McKinley at once said that the war in Cuba must stop, and Congress declared the people of Cuba free and independent, telling Spain to remove her soldiers from that territory. Spain refused and war opened between Spain and the United States.

After a few months the war came to an end by Spain giving Cuba her freedom, and selling the Philippines, Porto Rico and another small island to the United States for $20,000,000.

Before the end of the war with Spain, we also came into possession of the Hawaiian Islands. But in this time of our growing prosperity, our President was assassinated, and Vice-President Roosevelt became the twenty-sixth president of the United States in 1901. In 1903 a wonderful piece of work was completed by the American people, namely, the laying of a cable from San Francisco to the Hawaiian Islands, and from thence to Manila. On the fourth of July of that year, President Roosevelt flashed a message around the world.

In President Roosevelt's first administration the United States bought the rights of the French in the Panama Canal, a right for which we paid $40,000,000. The great World's Exhibition was opened at St. Louis on April 30, 1904, to celebrate the purchase of the Louisiana territory by President Jefferson. One hundred years previous that country had been a vast wilderness. Now it was thronging with the life of Western civilisation. So quickly did things take root and spring into vigorous being in the New World.

THEODORE ROOSEVELT, Republican. Twenty-fifth President. (1905-1909)

President Roosevelt was elected in 1904 after serving as president for more than three years of the term for which President McKinley had been chosen. During this term great progress was made in the government of our colonial dependencies, and a war against the waste of our natural resources was declared. You will hear a great deal more about the "conservation of natural resources" in the future. At the end of his term President Roosevelt sailed to Africa and spent over a year shooting big game and collecting specimens for the Smithsonian Institute.

WILLIAM H. TAFT, Republican. Twenty-sixth President. (1909-)

At the election of 1908, William H. Taft, who had been the first governor of the Philippines and had served as Secretary of War in President Roosevelt's Cabinet, was chosen. So far his administration has been exceedingly peaceful, and we have no very striking events to relate. Work on the Panama Canal has been proceeding very rapidly. You can read of his administration in the newspapers every day.

The sundew, a carnivorous plant, seems to know when food is near, for if meat be placed close to it, the plant slowly reaches out for it, as shown in these photographs taken at intervals of forty minutes.

DOES A PLANT EAT?

CONTINUED FROM 3438

In the answer to another question, on page 2797, we have seen that certain leaves of plants can tell the difference between light and dark, and this is a sort of seeing, though it is very different from our sight, and not nearly so useful. In this question we may remember, first, that trees are a kind of plant; and, second, that *feeling* means any kind of sensation, including the sensation due to light. So that really the answer is "Yes."

And, even if by *feel* we mean only the sensation of *touch*, the answer is "Yes" as regards many plants, that we call *sensitive plants*. Some of these are specially clever at feeling things, because they actually eat insects, and they require to know when an insect touches them. Plants of this kind are readily found growing wild in the United States, in Scotland, and in many other places. The leaf of the plant is covered with tiny sticky sensitive things looking like short hairs. If we touch the leaf with our finger, we see that it curls up. If a very small insect touches it, it is caught by the sticky stuff on the hairs, and the leaf quickly rolls up and catches it. So the insect dies, and the plant digests its dead body, and eats it. This is the simplest kind of what are called *carnivorous* or flesh-eating plants that are found in all parts of the world. Some of them make large traps, that close up and catch even strong insects. We know, then, that plants can see and can feel; but there is no proof that they can hear. Charles Darwin had the trombone played to a plant, and many other people have made experiments of a similar kind, but they all seem to show that plants do not hear.

HOW FAR CAN WE SEE?

When we say that our eyes see, all we really mean is, that light has entered them, and has affected them. If that happens, we see. It does not matter whether the light has been produced by a match that someone has held just in front of our eye, or whether the light has come from a star so distant that its light took ten thousand years to reach us. In either case, if light enters our eye in sufficient quantity to affect it, we see. This is quite simple when we come to think of it, but most people are confused about this question because they do not ask it quite rightly, another proof of that saying that everything depends on putting the

question rightly to Nature. We understand now that our eyes can see to any distance from which light can reach them. Of course, the question whether the light has travelled billions and billions of miles, or only half an inch, makes not the slightest difference to our eyes.

It is quite a distinct question at what distance our eyes can distinguish the details of a particular thing. This depends on a great many things, but it can be reckoned to some extent, and it is very important to do this for the case of different telescopes. We know that, if there were any building on the side of the moon next to us as large as the Capitol at Washington, it could be made out in our best telescopes.

WHY CANNOT WE FLY IN THE AIR AS WE SWIM IN THE WATER?

This is a very just question, because the two problems of swimming and flying are exactly the same in principle. In both cases, the body is heavier than the thing around it, and the problem is, somehow or other, to prevent it from sinking. But, in the case of swimming, the thing around the body, or *medium*, as we call it, is much nearer the heaviness of the body itself than in the case of air, and so the task is much less difficult. It is still less difficult in sea-water than in fresh, because sea-water is heavier. It is possible, however, for an animal that is not a bird, and that is made on very much the same principles as ourselves, to fly; and that animal is the bat. The bat knows, so to speak, as the Wright Brothers know, that if we want to fly, we must expose a large surface to the air, so as to get all we can out of the supporting power of the air.

So the bat, that has fingers of the same pattern as our own, has made them enormously long, and has stretched a web between them, and, thus provided with two beautiful aeroplanes, it can fly. We really see the same thing, as regards swimming, in the case of many web-footed birds, web-footed frogs and newts, and other similar creatures.

HOW IS IT THAT A BIRD CAN FLY WHEN IT IS HEAVIER THAN AIR?

People who spend their lives in destroying the lives of other creatures know that, when a bird is shot, it falls; in other words, a dead bird obeys the force of gravitation exactly as a hail-stone, or a raindrop, or a meteor must do. The force of gravitation is always acting even on the living bird. It is therefore plain that some force is produced that acts against the force of gravitation, balances it when the bird maintains its level in the air, or more than balances it when the bird rises in the air. This force, as we have seen, is produced by the life of the bird. It can be produced in other things that are not alive, as in a flying-machine, whether a real one, or one of the toy butterflies that we play with. In any case, there is produced a force that acts in the opposite direction to the force of gravitation, and is, for the time being, superior to it. We know that, in the case of the bird, the force is produced by burning the sugar in its muscles; in the case of the aeroplane, it is produced by burning the petrol in the engine; in the case of the toy butterfly, it was produced by burning the sugar in our muscles when we wound it up. Foolish people sometimes speak as if these were cases of defying one of Nature's laws. They are nothing of the sort. Gravitation goes on acting on the bird, whether the bird rises or falls. But, when the bird rises, a greater force is being opposed to the force of gravitation.

IF THE EARTH IS SHRINKING, SHALL WE EVER BE TOPPLED OFF?

When the earth or anything else shrinks, the stuff, or matter, in it gets no less; it is merely packed more closely. What keeps us on the earth is its gravitation, and that depends upon the stuff in it. The stuff is there just the same, however much the earth shrinks, and the force of gravitation at the surface, and therefore upon us, will indeed be more powerful as the earth shrinks, simply because this must mean that we get nearer to the great mass of it.

There will be a limit in any case to the extent to which the earth shrinks, just as there is to the shrinking of other things. The more anything shrinks, the more resistance there is to its shrinking any more. When anything begins shrinking, we must imagine that there is plenty of room between its atoms, and, as it shrinks, they get nearer to each other; but soon there is less room between them, and the time will come when the force of the atoms, squeezing against each other, will resist the force

PLANTS THAT CATCH AND EAT INSECTS

The teasel, that grows in the tangled corners of the fields and other waste places, has its leaves joined together at the base, forming a cup that collects the rain-water and drowns insects.

Here we have a closer view of the teasel's drowning-pot for insects. To what extent the teasel benefits by the insect soup that is formed after a shower, is not exactly known.

The sarracenia's leaves are like pitchers. They collect the rain-water and feed upon the insects that get drowned. The right-hand leaf here has been opened to show the insects.

This is a nepenthes. Its pitchers hang on long stalks, and insects are attracted by their honey-glands and bright colours. Once inside, they slip down and are drowned.

In this picture we see a single pitcher of the nepenthes with some insects about to enter. The pitcher has an ingenious lid on top, that opens only when the plant is fully grown.

Here we see the same pitcher cut open to show the dead insects inside. The plant digests them, for the pitcher produces digestive acids, just like an animal's stomach.

The Venus's fly-trap, shown here, was called "Nature's miracle" by Linnæus, the father of modern botany. If an insect alights upon a leaf, the leaf closes upon it like a spring trap in a few seconds, and digests the insect, taking, perhaps, a fortnight over the meal.

The English plant, the sundew, feeds upon insects. When a fly settles, it is held by a sticky juice that the plant produces, and the hairs, or tentacles, close round the insect and digest it. On the left we see a fly that has just settled, and on the right the fly half digested.

that is making the thing shrink. When the two forces balance one another, it will shrink no more. We see this at once if we watch any crowd gather ; it goes on shrinking until elbows begin to press against elbows, and then it stops.

WHAT MAKES TREES TURN INTO COAL WHEN THEY SINK INTO THE GROUND?

It is not every kind of tree that turns into coal, and we all know that coal is of many different kinds. It is not yet quite easy to make out all the reasons why different kinds of coal differ. We have to reckon with many facts, such as the particular kind of plant from which the coal was made, the amount of pressure it has been subjected to, the temperature it has been kept at, the kind of salts that were in the water that has trickled through it, and so on.

But still, this question can be fully answered in general terms. We may say that the difference between the tree and coal is, that the tree consists of a great many elements and compounds, while coal consists mainly of the element carbon only. Another way of putting our question, then, would be, What makes everything but the carbon go ? The answer is, that the rest of the body of the tree is slowly oxidised, or burnt away, but the conditions which obtain in the ground are such, that while the rest is burnt away, the carbon is not, and so it remains and forms coal. We see, when we burn a candle, that carbon is more difficult than other things to burn away. We know what a lot of black smoke and soot is apt to come from a candle, or from a lamp. That is the carbon which we have not succeeded in burning away; but, certainly, we shall not find any unburnt hydrogen.

WHAT IS PEAT AND HOW WAS IT MADE?

Peat, we may say, is half-way between trees and coal. It is made, of course, from vegetable matter, and we may find it in layers many feet thick. About one-seventh of the whole surface of Ireland is occupied by bogs in which the formation of peat has occurred, or is occurring. It is said that an inch or two of peat forms every year. We do not suppose that peat is made from just the same kind of plant as most of the coal that we know so well was made from, but still, the process that goes on is really the same. Peat varies a good deal, according to the extent to which part of it has been gradually oxidised away and the carbon left. On the average, about three-fifths of it consists of carbon. When dried, of course, it can be burnt.

WHAT IS THE WILL-O'-THE-WISP?

There is a particular kind of gas that is produced from decaying vegetable matter in marshy water, and is called marsh-gas. This is made of carbon and hydrogen, and is readily capable of being burnt. As it is produced, it is slowly burnt in the air, and so gives rise to a light. The gas, as it burns, shares in the general movements of the air, and so, of course, the light seems to dance about. This is a thing that has long been observed. It has an old Latin name that we may often see in print—*ignis fatuus*. It is also sometimes called Jack-o'-lantern. We can understand how stories might be made up about this light cheating travellers and dragging them into the marsh, where, perhaps, they would fall and die. At one time it was supposed that there might be some kind of tiny insects that hover over marshes at night, and give out a faint light. We know, of course, that there are insects that give out light, like the fireflies, But it is now generally admitted that the slow burning of marsh-gas is the real cause of the will-o'-the-wisp.

WHERE DOES INDIA-RUBBER COME FROM?

India-rubber is simply the sap or juice of certain trees and plants. Centuries ago, when Columbus discovered the island of Hayti, he found the people using balls of solid sap that they had taken from the trees, but he did not see that it was a product of any importance. It was not until the end of the eighteenth century that it was known in Europe.

It was first known under the name of elastic gum, and it was brought to us because it was found to be a good thing for rubbing out pencil-marks made on paper.

To-day, rubber manufacture is one of the most important trades in the world. Rubber is grown in various parts of Africa, in America, in Portugal, in British India, and in many other parts. Seeds of the best trees are taken every year to favourable climates, and, everywhere, the growth of the rubber-trees is extending. When

the tree reaches its prime, the rubber-gatherers cut rings in its bark. Soon, the sap begins to flow from these openings, and trickles down into pots placed at the foot of the tree. A good tree gives about twenty gallons of juice, or forty pounds of rubber, in a season. Then it will go on growing again, heal the wounds in its bark, and be ready to be tapped in the next following season. When the rubber leaves the tree it looks like thin cream. It hardens on meeting the air, and, when solid, is sent to market.

HOW IS INDIA-RUBBER PREPARED FOR USE?

In the factory, india-rubber undergoes what is called a vulcanising process. Sulphur is mixed with it, and the mixture is made very hot. Then it becomes more elastic, and very hard. That is what is needed for tires of bicycles, motors, and carriages; for hose-pipes, springs, buffers, gas and water pipes, doormats, dolls, machine-belting, waterproofs, cushions, beds, and so forth. Mixed with a larger quantity of sulphur, and made still more hot, the rubber becomes vulcanite, or ebonite, from which we make combs, pipe-stems, speaking-tubes, instruments that doctors use, telephone mouth-pieces, and other electrical appliances.

Rubber is needed for so many purposes that we can never get too much of it, and clever men are working, day after day, trying to discover how to make it. They can make sugar and indigo, and many other things that formerly they could get only from Nature, and they can make rubber, too. But the rubber that the clever chemists make costs so much that it is cheaper to buy that which grows in the forests across the seas. Some day men may be able to make it so cheaply that we shall not have to fear a rubber famine. Then tires and rubber dolls will be cheap, and perhaps we shall be able to have our streets paved with rubber, so putting an end to much of the noise of the traffic.

COULD WE SEE WITHOUT THE BRAIN?

The sight is entirely under the control of the brain, and is not perfect at first. All little babies, especially during the first few weeks of their lives, squint a great deal, and often the mothers are alarmed. But there is really no reason for getting frightened about this. After all, it is the most natural thing in the world. The brain is wonderful beyond all other things in earth, or sea, or sky, but it must learn. The tiny little spot in the baby's brain that has twelve muscles to look after, six for each eyeball, can hardly be expected to manage such a team all at once. Yet, in only a few weeks of practice, even the tiny brain of a baby learns how to control all this wonderful living machinery. It can send just the right kind of command along its nerve to one muscle, a different command along another nerve to another muscle, still a different kind of command, that it shall relax and let the others pull, along yet another nerve to yet another muscle, and so on, in perfect harmony, with all the twelve, so that the two eyeballs may move up and down together, or to left and to right, or, what is more wonderful and difficult still, both to left and upwards together. We, all of us, do this thousands of times every day of our lives, and yet many people have never given it a thought.

WHY DO WE SEE ONLY ONE THING WHEN WE LOOK AT IT WITH BOTH EYES?

The answer to this question can be guessed directly we make a very simple experiment on ourselves. Let us look at something with both eyes—say, at the outlines of the window-panes. Then let us press sideways with our finger on one eye, so as to push it forcibly a little way inwards or outwards. We shall find that we see double. This can only mean that, directly we interfere with the natural way in which the brain controls the movements of the two eyeballs, we see double.

Each eyeball has six little muscles attached to it, that pull it in the direction the brain desires; the nerves that run to the twelve muscles of the two eyeballs are all controlled by *one* little group of nerve-cells in the brain. The curtains at the backs of the two eyes have corresponding parts, so that images thrown on corresponding parts of the two curtains are *seen* by the brain as one image; but when the eyes are not properly worked together—as when we press on our eyeball—the two images of the thing we look at are not thrown on exactly corresponding parts of the two screens, or curtains, of the two eyes; and so we see two images of the thing instead of one. If we think of it, we

shall understand how wonderful this is, for, when we look at something on our left or right, it must be that the outer part of one screen corresponds not to the outer but to the inner part of the screen in the other eye.

WHY DO SOME PEOPLE NOT SEE STRAIGHT?

When the two eyes are not moved perfectly together, we say that the person squints; and if such a person *took notice* of what both eyes told him he would see everything double, because he would never get the two images of anything he looked at thrown upon the corresponding parts of the screens at the back of his two eyes. But, as a rule, such a person gets into the way of taking no notice of what he sees with one of his eyes, and of really using only the other. So he does not see double.

The commonest reason why people squint is, that one eye is perhaps short-sighted, and the short-sighted eye gives such blurred views of things compared with the other that the brain, so to speak, makes up its mind that it is not worth while to use that eye at all. So it simply gives up taking the trouble of moving that eye along with the other one, and so the person squints. The way to prevent this from happening is to use spectacles, with glasses of different shapes for the two eyes, so that their vision is made equal. Then, of course, the brain finds it well worth while to move both eyes together.

HOW IS IT THAT GRAVITY DOES NOT PULL THE STARS TO THE EARTH?

Everywhere and always, gravity is pulling every atom of matter in the universe towards every other atom. If, therefore, there were no other force at work in the universe except gravity, all the matter in the universe—stars and sun and planets and moons, and everything else—would certainly and quickly be gathered together into one huge round ball. But what we are apt to forget is, that, while gravity is constantly working, other things are at work too, and what happens in this case, as in every other, is the result of the balance, the give-and-take, the interplay, as we say, between the forces that are at work.

One of the forces at work in the universe is the motion of the various moving things in it, and that motion is, of course, a force opposing gravity on all sides, except the gravity due to anything towards which the body is directly moving. It is the earth's motion, for instance, that prevents the earth from rushing into the sun; and the earth's actual path is the result of the compromise between the motion that is in the earth, and the sun's pull. It has been supposed, by some thinkers, that most or all of the motions in the universe must get wasted away in time; not that anything is ever lost, but that they get frittered away as heat. If this were to happen some day, then gravitation, being unopposed, must necessarily pull everything together, and form the great ball we spoke of above. But there are so many other forces at work in the universe than those we have already clearly found out that we must not make any positive prophecies.

CAN THE WORLD GO ON IN ITS PRESENT FORM FOR EVER?

We are certain that, unless the sun should rush into another star, and make so much heat as to burn us all up—which is very unlikely—the earth will go on much as it is now for many ages to come; yet slow changes are always going on, and going on *in one direction*, that must lead to great results some day. The earth *must* be either getting cooler, or else using up the radium that keeps it warm; it is bound to become cold some day, as is the sun itself. That day may be far off—farther off than we are now from the time when the earth was formed—but it must come some time. Then there is evidence to show that the motion of the earth must be getting slower—though very slowly; and probably at last the earth will be drawn into the sun, and so end its independent history. Recent discoveries have made us form longer estimates of the time that these changes will take to happen; but it seems certain that they must happen some day.

WHY WON'T A PENDULUM SWING FOR EVER?

This question seems to assume that we might expect a pendulum to swing for ever unless something stopped it, and that is what makes it so good a question. If a thing moves, something has moved it. If the moving thing stops, something has stopped it. So our question is this: As a moving thing, such as a pendulum, must swing for ever unless something stops it, what stops it?

The things that stop a pendulum are, first, the resistance of the air. That we can understand, if we think of a pendulum swinging in an ocean of water instead of an ocean of air. If we make a vacuum, as nearly as we can, by sucking the air out of a space, and then swing a pendulum in it, it will swing for a long time. Only one thing remains to stop it, and that is the rubbing, or friction, between the top of the pendulum and the thing it is hanging from. So now we know the two causes that stop a pendulum.

WHAT MAKES THE FIELDS WHITE WITH MIST AT NIGHT IN THE HOT WEATHER?

The mist, of course, is water, and it is not water-vapour, or gas, but drops of liquid water. It is exactly the same as a cloud, and if we pass through a cloud in a balloon, it looks just the same as this kind of mist. The hotter the air is, the more water-vapour it can hold. If the air is made very hot by the sun in the daytime, and if there is much water near, and little wind, then the air, as the day goes on, comes to hold a very large quantity of water-vapour. This is a transparent gas, mixed with the other transparent gases that make the air, and so, of course, we cannot see it. But, as the sun sets, the air quickly gets cooler. Then it cannot hold as much water-vapour as it did before, and so a good deal of the water turns into liquid drops, and makes a mist, just like the mist our breath makes on a cold day. If there is much moisture in the ground, this mist naturally forms nearest the ground, and so looks like a sea of steam. It may be a very shallow sea round our legs, so that we can see clearly above it far away, but cannot see our own feet if we are walking through it.

WHY DOES A PIECE OF IRON TURN RED WHEN IT IS HOT?

When iron turns red, this means, we know, that it is producing light of the particular kind that impresses our eyes as red, and we see the iron by this light. Of course, we see the iron when it is cold, but only by light reflected from its surface. If the cold iron be put in the dark, we cannot see it, but red-hot iron glows in the dark. The point is, then, that the red-hot iron shines by its own light—makes light of its own. Lumen is a Latin word for light, and so we say that the iron becomes luminous. The particular character of the light given out by the iron will depend upon how hot it is, for we know that if red-hot iron is heated it turns white. This fact about iron is common to most things, or, indeed, all things; when they are heated up to a certain point,

This photograph shows a bank of mist filling a valley, and gradually enveloping a hill

they become luminous. Light, we know, is made of waves in the ether, and all we can say is, that the atoms of a hot thing move about so as to make those waves in the ether that we call light.

WHY DOES A KETTLE NOT GET RED HOT WHEN IT IS HEATED?

If we have read the answer to the last question we shall be prepared to answer this one for ourselves; and the first thing that we shall notice is, that the question is not properly asked, for if we simply take a kettle and heat it, it *does* turn red hot. But what was meant, when this question was asked, was: How is it that the same kettle—which, of course, heated by itself would turn red hot—does not turn red hot when it is put on the fire, *after having been filled with water?*

Well, we know that the reason why a thing gives out light is, that it is hot. So it must be that, in some way, though we are applying heat to the kettle, it does not get hold of heat enough to make it luminous. The reason is, that water will hold more heat than any other thing we know, and that nothing is greedier of any heat in its neighbourhood. So the water takes the heat from the kettle, and does not allow the bottom of the kettle ever to get hotter than the temperature of boiling water. That is hotter than our fingers like, but it is much below the temperature at which iron becomes luminous.

WHY IS IT THAT WE HAVE BONES IN OUR BODIES?

The first use of our bones is, by their strength and resistance, to form a supporting framework for our bodies, and prevent them from collapsing in a shapeless mass on the surface of the ground under the influence of the earth's gravitation; that is what would happen to a boneless man, if there could be such a person; and if we had both our legs broken, we should soon find how useful whole bones are in resisting the pull of the earth, which we could not resist in such a plight as that suggested. Even apart from the pull of the earth, our skeleton is necessary to hold the body in its shape; and so fishes, too, have bones. When we are eating a herring, we object to the bones, but if there were no bones there would be no herring. The second use of our bones is to furnish rigid bars on which our muscles can pull. One end of the muscle is attached to one bone, say, the bone of the upper arm, and the other end to another, such as one of the bones of the forearm, and then, when the muscle shortens, the joint between the bones is bent, and we can lift what is in the hand. Our muscles could not be the wonderful servants of our wills that they are if we had no bones.

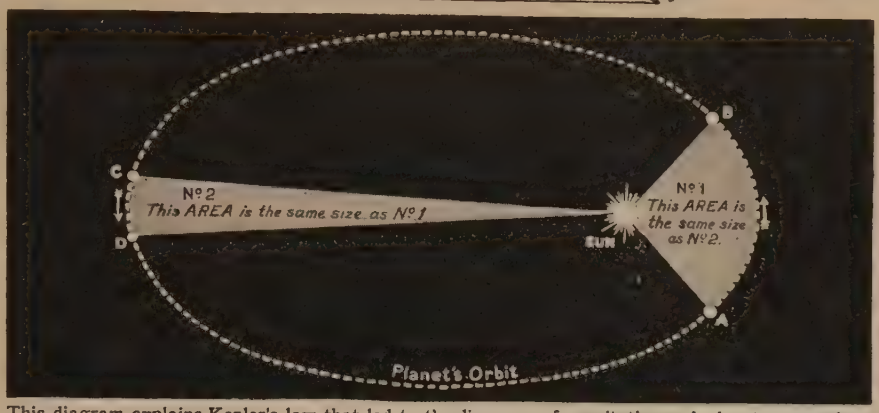
And, lastly, the red cells of our blood, without which we could not breathe, are made in the living marrow of most of our bones.

WILL THE EARTH EVER SHRINK UP TO NOTHING?

We believe that, though everything in the universe is *changed*, nothing is ever destroyed and made into nothing. Almost the first fact men realised when they began to think—and to-day we are surer of it than ever—is that nothing is made out of nothing, and that nothing is reduced to nothing. The answer to the question must therefore be, No. If the earth were ever to cease to exist, it would be either because it fell into some other world, such as the sun, or because it kept on losing bits of itself until nothing was left. It could never become nothing by shrinking, as we see directly we remember what shrinking is.

Shrinking means getting smaller in size, or bulk, or volume. If a thing gets packed tighter together, it shrinks; it gets less in size, but it does not get any less in the amount of stuff in it. A metal ball shrinks when it is cooled, and expands when it is heated; but there is just the same amount of stuff in it. It merely gets denser—smaller, but *heavier in proportion to its size.* That is exactly what is happening to the earth as it cools. It is losing to the outer world hardly any of the stuff that makes it; it is daily gaining, by the stuff of all the shooting stars and dust from space that fall upon it. Apart from this, it is simply getting more tightly packed together. We may have heard stories about things shrinking away to nothing, but they are absurd. That cannot happen, unless the thing is gradually losing more and more of itself to the world around it. If that went on it would come to nothing; but that would not be shrinking.

The next Questions are on page 3687.



This diagram explains Kepler's law that led to the discovery of gravitation. A planet moves along the boundaries of equal areas in equal times, and so moves from A to B in the same time as from C to D.

WHY THINGS MOVE

CONTINUED FROM 3470

NEWTON'S three laws are simply called the laws of motion. Kepler's three laws are called the laws of planetary motion; they deal not with motion in general, but with the movements of the planets. With immense labour, continued for many years, Kepler showed that all the planets which were then known moved according to certain laws, their speeds depending upon their distance from the sun, and so forth. The calculations and statements of these laws are rather complicated, and do not matter for us now. There was no obvious connection between the three laws; there were simply three facts about planetary motion that were found by him and put down one after the other. But when the still more glorious mind of Newton considered these facts, he saw that there lay hid in them the law of gravitation, upon which they all depend.

This law is responsible for perhaps the greater part of all the motion in the world. It is the law, as Herbert Spencer said, "by which the universe is balanced." If the different bodies that make up the universe were still, and were balanced, at rest, by the law of gravitation, that would be wonderful enough. But they are all in motion, and are yet controlled. This great law explains the motions we see in the heavens on one great principle, which applies equally to the motion of an apple let fall from a tree, and of the moon round the earth, and the earth and the other planets round the sun. But, said a great philosopher, we shall never be able to tell whether gravitation exists among the stars. We have now proved, however, that it does exist there also. We can tell the mass and the distance of stars that have never been seen, by the motion which they produce through gravitation in other stars that we can see.

No question of distance, then, destroys the working of this mighty law that every portion of matter in the universe attracts every other portion of matter with a power that depends, in an absolutely regular way, upon the amount of stuff which is being attracted, and upon the distance. This law would alone suffice, if necessary, to make the universe really one.

> All things by immortal power,
> Near or far,
> Hiddenly
> To each other linkéd are,
> That thou canst not stir a flower
> Without troubling of a star.

This is how one of our poets has expressed it, and his lines make it

beautifully clear for us. The same poet, Francis Thompson, has said the same thing, still more beautifully:

I do think my tread,
Stirring the blossoms in the meadow-grass,
Flickers the unwithering stars.

Now, of course, a very serious question for us is whether this great law can be at all changed or altered in its working by anything. We have evidence, as we have seen, that distance does not destroy it at all. But if we come back to earth and study the working of gravitation in the laboratory, can we affect it there? Many workers, for some years past, have devoted their whole lives to this question.

For instance, if we put something in between two other bodies, do we interfere with the gravitation between them—as if gravitation were something like light, which could be cut off—or does gravitation take no notice of obstacles? The answer to this, as the result of the most careful study, is that the gravitation between two bodies is exactly the same, their consequent weight and motion, or tendency to motion, being absolutely unaltered by the presence or absence of any obstacle of any kind between them.

THE GREAT FORCE OF GRAVITATION THAT NOTHING WE KNOW CAN STOP

Whether through air, or through water, or through the ether of space alone, whether through intervening blocks of granite, or anything else, the power of gravitation is neither more nor less. If no distance and no obstacles interfere with gravitation, what would be the result of heat? If we take a thing that has a certain weight owing to the earth's pull for it, and its pull for the earth, and if we examine that same thing, first when it has been made fifty times colder than ice by being plunged in liquid air, and then when it has been made white hot, we find that the influence on the force of gravitation is nothing.

At least, we may put it this way. If we lift this book up in our hands from the table—say, six inches—we increase its distance from the centre of the earth. The book is lighter because the force of gravitation regularly lessens as the distance increases, though no distance will prevent it from working. Now, this difference in the weight of the book, due to its having been lifted six inches, is, of course, extremely slight. But in the newest experiments that have been made on gravitation, we are able to say that if, for instance, heat produced a difference in gravitation as great as the tiny difference produced by lifting the book from the table, we should have detected it. Most people will agree that if tremendous changes in temperature do not affect gravitation even to this extent, probably they do not affect it at all.

ATOMS OF MATTER THAT WEIGH THE SAME WHETHER THEY ARE BOUND OR FREE

We have failed to abolish gravitation by distance; we have failed to block it by any obstacle; we cannot affect it by temperature; but what will happen if we take certain weights of two elements, like oxygen and hydrogen, and then combine them to make water? In other words, does chemical combination, or, of course, the opposite, which we call decomposition, affect gravitation? Do all the atoms of two different things weigh exactly the same, no matter whether they are independent of each other, or whether they are powerfully bound to each other, as they are in the case of water? The answer to this question is that chemical combination and decomposition have no more effect on gravitation than anything else has.

Other ways of trying to affect gravitation have been experimented with. They have all signally failed. We know of nothing that will cause this force to turn one hair's breadth either way from its appointed course. As Sir Joseph Thompson, one of the greatest of living authorities, has lately said, there seems to be no way of getting hold of gravitation. If we could once get our hands on it, we could do anything, but no method that has ever been tried has enabled us to modify it at all. Most people do not in the least understand what this means, however.

A WELL-KNOWN MAN WHO TRIED TO DEFY THE LAW OF GRAVITATION

In a celebrated discussion last century, a very well-known man declared that he could defy the law of gravitation by holding an apple in his hand and preventing it from falling; but he was opposing force with force, and as long as the law of gravitation acted, he had

to pay his price every moment for holding up the apple. Exactly the same applies to flying-machines. The force of gravitation is always acting, and from moment to moment the flier, like the bird, has to balance this force by some other acting in the opposite direction. The bird gets this force by burning the sugar in its muscles; the aeroplane gets it by burning the petrol in its engines.

STRANGE THINGS THAT WOULD HAPPEN IF WE COULD CONTROL GRAVITATION

But suppose for a moment that in some way we could abolish gravitation, or get hold of it, or cut it off by a screen, then everything would be utterly different. There would be no problem in flying. Neither the bird nor the aeroplane would require to burn any fuel, except just the little amount required to overcome the resistance of the air. There would be nothing to pull the bird or the aeroplane downwards, and an apple released from the hand would not fall until we gave it a smart tap downwards. But one might go on for pages describing the endless extraordinary results that would follow if we could control gravitation. That time may come.

At present, however, not only can we not control it, but we cannot begin to understand it. We can measure it to a nicety, but as to how it acts we know nothing. There are at least twenty-four theories on the subject, and, as Sir Joseph Thompson has said, any one of them may be true; but just because we cannot influence gravitation in any way, we can test none of the theories. There are signs, however, that by working at the problems of electricity we shall ere long be able to go farther than before in this study.

A BOY WHO HELPED THE WORLD BY WATCHING A LAMP SWING IN A CHURCH

At present, however, about 250 years after the discovery of gravitation, we can only say that while we have proved the truth of Newton's law, and its independence of every kind of condition that we can imagine, we know no more of the cause of gravitation than he did, and he knew nothing at all.

It was right to begin with Newton's laws of motion, and then to mention Kepler's laws of planetary motion, as they led up to Newton's great law of gravitation; but we must not forget to do honour to the real beginner of all these inquiries. This was the "starry Galileo," whom we all think of as an astronomer. He was, indeed, one of the greatest of astronomers. But most of his astronomical discoveries depended upon that ingenious mind which enabled him to invent his telescope, and those qualities of mind enabled him also to invent many experiments, so important as to make it true that "the science of motion began to exist with Galileo."

There is a splendid bronze lamp which hangs to-day, as it did in Galileo's time, from the roof of the cathedral at Pisa, and if we watch it we notice that it swings. Watching it at the age of nineteen, Galileo put a finger of one hand on the pulse of the other wrist, and, using this natural clock, he found that always, whether the lamp was making large swings or small, each swing or vibration took exactly the same time as any other. This was a most important discovery in the science of motion, and fifty years later Galileo put it to practical use by making a clock that depended on the constant swing of a pendulum.

WHY THE PENDULUM SWINGS TO AND FRO, AND THE LAW THAT GOVERNS IT

It is worth our while to notice one or two things about the swing of a pendulum. First, there is Galileo's great discovery about the constancy of the rate for any particular pendulum; second, we must ask ourselves where the motion comes from. When the pendulum hangs still, the bob of the pendulum is as near the centre of the earth as it can get. Gravitation is therefore satisfied, and does nothing. But if we start the pendulum swinging, either by pushing it or by lifting it to one side and letting it go, then it starts moving.

Why? If we tie a weight to the end of a piece of string and hold the string in our hand, we can study this for ourselves. We see at once that when the bob of the pendulum is at one end of its swing, gravitation demands that it shall fall. In falling it obeys the law of falling bodies, which we shall study in a moment, moving faster and faster, until it reaches its lowest point, but it does not stop there, as we might expect. It does not stop because, in falling, it has come to contain power or energy or motion, and this is sufficient to carry it up again on the other side against the pull of the earth, but always more and

more slowly, because it is doing work against the earth's pull, and therefore losing power. So at last it stops, and then the same thing happens again.

The power in the pendulum is the power that was put into it when it was pushed or lifted. It is not there when the pendulum is at rest, and it has not come from nowhere. The least touch is sufficient to start it swinging, and we may ask ourselves what becomes of that little portion of power that was put into it when it was touched. Now, nothing is lost, and if the pendulum stops swinging, no matter how little the swing ever was, we must account for the power that started it. It goes just as the power goes in a cricket-ball or a curling stone; it goes in friction where the pendulum is hung, and it goes in the resistance of the air. If, then, we could make a pendulum so hung that there was no friction, and if we could swing that pendulum in empty space, instead of in a heavy ocean, which the air really is, it would swing for ever. The power put into it would have no occasion to leak away, and so would remain.

THE WONDERFUL MACHINERY OF YOUR BODY, WHICH NEVER STOPS IN HEALTH

Let us not suppose, however, that this is what is meant by perpetual motion. Directly we asked that pendulum to do any work by turning a wheel or resisting a little air, or anything else, then the power in it would leak away, and it would come to a stop.

Perpetual motion is a phrase which is always used for a certain idea, but few phrases could be worse to express what it means. A healthy child is a case of perpetual motion, and, indeed, whether we are old or young, asleep or awake, parts of our bodies are always moving. So far is perpetual motion from being impossible, that, indeed, the more we learn, the more we find that everything is moving—perhaps even that which we call matter is simply a kind of motion of something. It is almost a question whether there is anything in the world to study except motion, and yet we must have heard it said that perpetual motion is impossible. We should understand what we really mean when we use this phrase. What is impossible is to get something out of nothing, and that is what so-called perpetual motion machines all try to do. For hundreds of years past people have been trying to make machines that would do work for ever without being wound up or without having anything burnt inside them.

A MACHINE THAT NO MAN WILL EVER BE ABLE TO MAKE

More than a hundred years ago now, the Paris Academy of Sciences decided that it would take no farther notice in future of any accounts of perpetual motion machines sent to it. At first sight that seems very wrong, because science must always be willing to listen to new things. But it is really quite right, because we know now that no one will ever make a perpetual motion machine. The man who did that would be a Creator.

If power is to be used, it must come from somewhere; if work is done, someone or something must do it. This is true even of the atoms of radium, as it is of everything else. More than that, it is strictly, rigidly true of our own bodies, and of the bodies of all living things. They are a million times more marvellous than any machine that was ever made. Parts of them will work continuously for, perhaps, as long as a hundred years; these machines can repair themselves without stopping; but they are not perpetual motion machines in the sense that this phrase means.

For every heart-beat, for every time that we raise an arm or an eyelid, a certain amount of work has been done, a certain quantity of matter has been moved through a certain distance at a certain speed, and if we know what these figures are, it can be calculated exactly how much carbon, probably in sugar, had to be burnt up in the body in order to do that work.

WHY WE MUST BE FED WITH POWER IF WE ARE TO SPEND POWER

If we were perpetual motion machines we could live without food. And the whole point and meaning of the fact that we and all living creatures have to take food, is that we are not perpetual motion machines, but, like every other machine on earth, must be fed with power if we are to spend power. It was long supposed that living creatures were exceptions to this great law, which, as we see, is really the law

of the conservation of energy. We now know that this is not so, and that all living creatures, however wonderful they may be, and however different from things around them, are yet parts of the universal whole, and subject to the same laws. In every generation there are people who will not believe this, and who propose, either by the use of a living creature, or by some kind of machine, to make something out of nothing, but they have always failed, and always must fail.

Now we may go back to another great discovery of Galileo, about which we read on page 304, and we shall see how its meaning fits in with what we have learnt about work. By dropping balls of different weights from the leaning tower at Pisa, Galileo showed that they all reach the ground at the same time. It had been believed for about two thousand years, on the authority of a great Greek thinker, Aristotle, that a ball weighing ten pounds would reach the ground when a ball weighing five pounds would only have reached half-way. In all that time, so curious is the way in which people used to take things for granted, no one until Galileo had really asked Nature what the truth was.

The nearer anything is to the centre of the earth, the heavier it is. If it were possible to erect a gigantic pair of scales in England and to put a one-pound weight in each pan, one hanging over the Equator and the other over the North Pole, the latter would drop, because it is 26 miles nearer the centre of the earth.

But we must understand this. Surely a big ball, acting upon the earth, and acted upon by the earth, has more power than a little one? Surely we would rather be struck by a small hailstone than by a big meteorite? Surely where there is more power at work there should be greater speed? The answer is yes, there is more power at work, but there is more work to do, for there is more matter to move. The bigger the stone, the greater the power in proportion to the size of the stone; but the amount of work to be done in moving the stone increases in the same proportion, and so all bodies falling under the influence of gravitation fall at the same speed, and for any body whatever, for every second that it falls, its speed is increased in the same degree as in any other case.

Now we shall say that, after all, this is simply not true, because, as everyone knows, a feather takes longer to fall than a stone. But if we could imagine the air swept away, the feather would fall like the stone. This can be proved. We can take a long tube, remove the air from it—or, at any rate, remove quite enough for our purpose—and then let go, say, a bullet and a feather at the same moment from the top of the tube. We find that they reach the bottom together. That was a great discovery, and here is yet another that Galileo made. Aristotle taught that there were two things, weight and lightness; weight or gravity made things fall, and lightness or levity made them rise. Things that had the principle of gravity in them, like a bullet, would fall, and things that had the principle of levity in them, like hot air, would rise, according to Aristotle. Galileo showed that this was untrue. Everything in the universe has gravity in it, just because the law of gravitation applies to all matter everywhere. There is no such thing as a principle of lightness, or levity. Hot air rises, a balloon rises, a cork floats, not because these things have no weight in them, but simply because they have less weight in them than the things around them have, and so the things around them fall in beneath them, so to speak, and push them up.

But the most wonderful thing about Galileo was that he really saw for himself, and without anyone working before to help him, what Newton and the great workers of the nineteenth century proved. He saw that whenever there

is motion, there is force, power, or energy at work. This idea of force as involved in all motion was new to Galileo, and it is the foundation of the whole science of motion. The proper name for the science of motion is dynamics, which is the Greek for force.

ENERGY THAT IS NEVER CREATED AND CAN NEVER BE DESTROYED

The truth is that no one before Galileo seems to have seen that causes must have effects, and effects causes; that big causes must have big effects, and big effects big causes. So, wherever there is much motion, there is a proportionate cause at work. Galileo, of course, wrote in Latin, and used the Latin word *vis*, which means force, and Newton also wrote in Latin, and used the same word; but last century an Englishman, Dr. Thomas Young, began to use the word energy. And we say now that wherever there is motion, there is energy; that this energy is never created and never destroyed, but eternally transformed. These great ideas really date from the mind of Galileo, who actually worked out for himself in a rough way all of Newton's laws of motion. It is very interesting, however, that though both Galileo and Newton must have had in their minds the idea of the conservation of energy, neither of them stated it in so many words, and this was left for some German men of genius in the nineteenth century.

Energy is energy wherever it is, and in whatever form it is; but it has different forms, and two of these must be understood. The words describing them are certainly rather long, but they are not difficult to understand. When a thing is moving, we say that it has in it energy of motion. The proper name for this, taking the Greek word that means motion, is *kinetic* energy.

THE TWO KINDS OF ENERGY THAT ARE SEEN IN THE SWINGING PENDULUM

There is no difficulty about this. When the bob of the pendulum swings downwards, faster from moment to moment, it is gathering kinetic energy, or energy of motion. Now, the other kind of energy is energy that does not show itself at the moment in anything, but the power or potency of it is there—*potentia* is Latin for power. It is therefore called potential energy. Now, throughout the world we can constantly see potential energy turning into kinetic energy, and *vice versâ*. The pendulum is a most beautiful illustration of this. When we pushed or raised the bob of the pendulum, its motion upwards showed kinetic energy; when it ceased moving upwards any farther, that motion was not lost, but was stored up in the bob of the pendulum as potential energy. It did not move, but it had within itself the power to move.

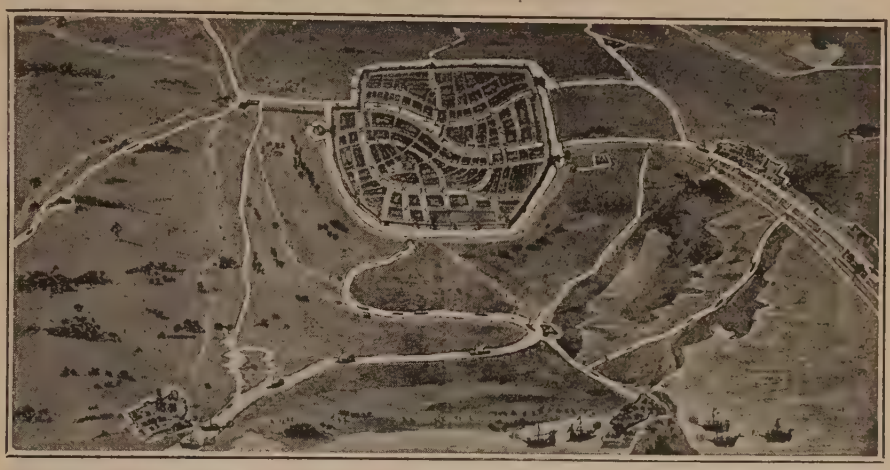
Then, when we let it go, the potential energy was changed into kinetic energy, as its motion proved. This kinetic energy enabled the pendulum to rise again after it had reached its lowest point. And now, at every moment, as the pendulum rises, it moves more slowly; its energy of motion, or kinetic energy, is being changed, though not lost, and when the pendulum reaches its highest point on the other side, all the kinetic energy has been changed into potential energy; and so this transformation backwards and forwards goes on as the pendulum swings.

HOW MEN ARE LEARNING TO GET ENERGY FROM THE SUNSHINE

But we can learn from this still more about the changes of energy. When we pushed or lifted the bob of the pendulum, where did that kinetic energy come from? We have already learnt that the living body did not create it; our muscles made this energy of motion out of the potential energy existing in the sugar stored up in the muscles and derived from the food. This kind of potential energy, existing in sugar and other chemical things that can be burnt, is sometimes called chemical energy; but it is a kind of potential energy, and can be changed into energy of motion just as in the case of the bob of the pendulum when it is at its highest point.

But where did that potential energy in the sugar come from? Did the plant which made that sugar create that energy? That cannot be, we know. The plant made that potential energy out of the energy of motion, or kinetic energy, of the sunlight which streamed upon it. And we are now learning that that kinetic energy of sunlight probably came in greatest part from the potential energy stored up in the atoms of the sun.

The next part of this is on page 3669.



HOW THE SEA SAVED HOLLAND

CONTINUED FROM 3472

SET in the midst of pastures, gardens, and orchards, with the Rhine running through the streets in many channels, Leyden, of which we see a plan on this page, was, in May, 1574, indeed a beautiful city. But the whole country was disturbed by the Spaniards, who were trying to force their religion on the Protestant Netherlanders. The people of Leyden would not submit, so an army under Valdez was sent to besiege the town. Encouraged in their resistance by the Prince of Orange, the brave little garrison shut the gates of the city, and the inhabitants were put on a strict allowance of food.

Now, Holland is below the level of the sea, which is only kept back, as we read on page 3456, by great dykes. The prince sought means to relieve the besieged; but, with the Spaniards all around the town and along the coast, there seemed but one way. He could not send ships to Leyden by sea, but he could send the sea to Leyden, and let the ocean drive away the Spaniards. He would pierce the dykes, open the sluices, and so save Holland. The people were willing, and said: "Better a drowned land than a lost land."

And so, in August of that year, the dykes on the coast were burst, and the waters crept down over the country towards the starving city. The Spanish army watched the water rise higher and higher between the dykes, first with surprise, then with alarm. A Dutch fleet of 200 vessels was fitted out and sent towards the city, which was, however, so well protected that it could not be reached for several weeks.

First a strong dyke, the Landscheiding, five miles from the city, was captured and pierced. The boats sailed through the openings, but the next dyke was found still one foot above the water, and when that was breached, the water beyond was too shallow to carry the boats, and they could only advance through a canal which was well guarded by the Spaniards. Alas for starving Leyden! The brave little fleet was repulsed, for the wind blew the waters back from the city.

On September 8, however, a gale arose from the north-west, and blew for three days, driving the waters nearer to the walls. Then the Spaniards retreated, as the waves, carrying the boats, advanced. Another long delay, due to an easterly wind, and yet the patient citizens, gaunt, feeble, racked by fever and pestilence, refused to yield. Some of them reproached the burgomaster for

not yielding, but his courage and patriotism did not fail, and he answered: "I know that we shall starve to death if we are not soon relieved; but starvation is preferable to the dishonoured death which is the only alternative. My life is at your disposal; but expect no surrender so long as I remain alive."

The people gained courage from his words; a dove flew into the city bearing a message of hope, and, on October 1, a gale blew the waters close up to the walls. On the flood floated the relieving fleet, and there was a sharp encounter with the Spaniards, whose boats were sunk. Now the fleet was within a few hundred yards, and the men, jumping out, shouldered the boats through the shallows. There remained but one more fort of the besiegers to be taken. At dead of night the citizens watched lights come out from it and flit across the water.

In the morning a boy was seen at the top frantically waving his cap. He was a Dutch boy, and had seen the Spaniards escape. So the fort was entered, and the fleet swept alongside the quays throwing bread to the starving people. Then men, women, and children went to the cathedral, and thanked God for their deliverance, and, as a monument of their gratitude, they next year founded the famous Leyden University.

THE CLIMB UP THE CAPITOL HILL

We read, elsewhere, how the beautiful city of Rome was taken and plundered by the Gauls. A story of one of the bravest Roman citizens who lived at that time stands out in the history of that terrible disaster. When Rome was besieged, one of her ablest generals was away from the city, for he had been falsely accused of taking more than his share of the plunder at the capture of Veii, a neighbouring city.

Angry and disgusted with the treatment he had received, Camillus had taken up his abode at Ardea. By his ability, he saved this city from destruction by the invading Gauls. When the Romans heard of this exploit they repented, saying: "If only our brave Camillus were here, he might save our city also from the dreadful Brennus." So they sent a message, begging Camillus to return and help them. But Camillus, who was a proud, haughty man, refused, saying that he was only an exile, and would need a decree from the Senate before he returned to Rome.

Now, the senators who were still alive were in the besieged Capitol, which stands high up on the Capitoline Hill, and could not be reached without passing through the Gallic lines; but a patriotic young Roman, Pontius Cominius, offered to undertake the mission.

Dressed as a peasant, and with corks about his neck to keep his head above water, he plunged, one dark night, into the Tiber, and drifted down to the base of the Capitoline Hill. Now came the dangerous part of the venture, for Cominius had to climb up to the Capitol. He clung to grass, vine-stem, or point of rock as he dragged his body up the steep ascent, using his bare feet to aid him, and all the time keeping a sharp look-out for any Gaul on the watch, until at last he reached the rampart. There he called out his name, and was immediately surrounded by his eager countrymen. He told them that Camillus only waited the Senate's decree to come to their help. Camillus was quickly voted Dictator by the few senators who were left, and Cominius at once returned down the hill, luckily escaping without being seen by the Gallic sentinels.

Though he got safely away, the Gauls noticed that someone had disturbed the creepers, and that stones were displaced, so they planned a night attack on the Capitol. When they carried this out they found the sentinel asleep, but the cackling of the sacred geese in the Capitol warned the citizens, and they repulsed the attack. However, the besieged were starving, and were driven to treat with Brennus. While the ransom was being discussed, Camillus, with his soldiers, appeared on the scene, and exclaimed: "It is with iron, not gold, that Romans guard their country."

Soon after, the Gauls were driven away, and the Romans acknowledged that they owed their rescue to the brave Cominius, who, at the risk of his own life, had brought Camillus to them.

THE NEXT GOLDEN DEEDS ARE ON PAGE 3659

A FABLE TOLD IN VERSE

AMONG the many lesser poets who, while attempting only the treatment of homely subjects, have yet left us poems which, though in form no better than the commonest rhyme, have said something that will be long remembered, Mary Howitt has a place of some eminence. We have already had occasion to speak of Mrs. Howitt and her husband, William Howitt, in reading other poems of theirs printed in this book. They deserve to be remembered for the healthy and elevating character of all they wrote. None of Mary Howitt's verses for young people is better known than "The Spider and the Fly," with which almost every American boy and girl is bound to make acquaintance. Like many another of the poems given in our book, this is a fable in rhyme. The story itself is a very old one, the idea of the spider luring the silly fly to destruction having been a popular illustration of the danger of listening to flattery, long before Mrs. Howitt gave it this versified form.

THE SPIDER AND THE FLY

CONTINUED FROM 3422

"WILL you walk into my parlour?" said the spider to the fly.
"'Tis the prettiest little parlour that ever you did spy;
The way into my parlour is up a winding stair,
And I've many curious things to show when you are there."
"Oh, no, no," said the little fly, "to ask me is in vain,
For who goes up your winding stair can ne'er come down again!"

"I'm sure you must be weary, dear, with soaring up so high;
Will you rest upon my little bed?" said the spider to the fly.
"There are pretty curtains drawn around; the sheets are fine and thin,
And if you like to rest a while, I'll snugly tuck you in!"
"Oh, no, no," said the little fly, "for I've often heard it said,
They never, never wake again, who sleep upon your bed!"

Said the cunning spider to the fly: "Dear friend, what can I do
To prove the warm affection I've always felt for you?
I have within my pantry good store of all that's nice;
I'm sure you're very welcome—will you please to take a slice?"
"Oh, no, no," said the little fly, "kind sir, that cannot be;
I've heard what's in your pantry, and I do not wish to see!"

"Sweet creature!" said the spider, "you're witty and you're wise,
How handsome are your gauzy wings, how brilliant are your eyes!
I've a little looking-glass upon my parlour shelf,
If you'll step in one moment, dear, you shall behold yourself."

"I thank you, gentle sir," she said, "for what you're pleased to say,
And bidding you good-morning now, I'll call another day."

The spider turned him round about, and went into his den,
For well he knew the silly fly would soon come back again;
So he wove a subtle web, in a little corner sly,
And set his table ready, to dine upon the fly.

Then he came out to his door again, and merrily did sing:
"Come hither, hither, pretty fly, with the pearl and silver wing;
Your robes are green and purple—there's a crest upon your head;
Your eyes are like the diamond bright, but mine are dull as lead!"

Alas, alas! how very soon this silly little fly,
Hearing his wily, flattering words, came slowly flitting by;
With buzzing wings she hung aloft, then near and nearer drew,
Thinking only of her brilliant eyes, and green and purple hue—
Thinking only of her crested head—poor, foolish thing! At last
Up jumped the cunning spider, and fiercely held her fast.
He dragged her up his winding stair, into his dismal den,
Within his little parlour—but she ne'er came out again!

And now, dear little children, who may this story read,
To idle, silly, flattering words, I pray you ne'er give heed;
Unto an evil counsellor, close heart and ear and eye,
And take a lesson from this tale of the spider and the fly.

FIDELITY

Among the numberless poems in which the fidelity of the dog is celebrated, this, by William Wordsworth, takes a high place. There are many instances of dogs that have shown as great fidelity to their masters as the shepherd's dog here described, and they are all worthy of the poet's praise.

A BARKING sound the shepherd hears,
A cry as of a dog or fox;
He halts, and searches with his eye
Among the scattered rocks:
And now at distance can discern
A stirring in a brake of fern;
And instantly a dog is seen,
Glancing through that covert green.

The dog is not of mountain breed;
Its motions, too, are wild and shy;
With something, as the shepherd thinks,
Unusual in its cry:
Nor is there anyone in sight
All round, in hollow or on height;
Nor shout, nor whistle strikes his ear:
What is the creature doing here?

It was a cove, a huge recess,
That keeps, till June, December's snow;
A lofty precipice in front,
A silent tarn below;
Far in the bosom of Helvellyn,
Remote from public road or dwelling,
Pathway, or cultivated land;
From trace of human foot or hand.

There, sometimes, doth a leaping fish
Send through the tarn a lonely cheer;
The crags repeat the raven's croak,
In symphony austere;
Thither the rainbow comes, the cloud—
And mists that spread the flying shroud,
And sunbeams; and the sounding blast,
That if it could would hurry past;
But that enormous barrier holds it fast.

Not free from boding thoughts, awhile
The shepherd stood; then makes his way
O'er rocks and stones, following the dog
As quickly as he may;
Nor far had gone before he found
A human skeleton on the ground:
The appalled discoverer with a sigh
Looks round to learn the history.

From those abrupt and perilous rocks
The man had fallen, that place of fear!
At length upon the shepherd's mind
It breaks, and all is clear:
He instantly recalled the name,
And who he was, and whence he came;
Remembered, too, the very day
On which the traveller passed that way.

But hear a wonder for whose sake
This lamentable tale I tell!
A lasting monument of words
This wonder merits well.
The dog, which still was hovering nigh,
Repeating the same timid cry,
This dog had been through three months' space
A dweller in that savage place.

Yes, proof was plain that since the day
When this ill-fated traveller died,
The dog had watch'd about the spot,
Or by his master's side:
How nourished there through that long time,
He knows who gave that love sublime;
And gave that strength of feeling great,
Above all human estimate.

SHE IS FAR FROM THE LAND

Thomas Moore, the celebrated Irish poet, is likely to be remembered in time to come chiefly for his exquisite songs, of which "The Minstrel Boy," on page 642, is one of the best examples. The following is another of his tuneful lyrics. "The Island of Sorrow" referred to in the last line is, of course, the poet's native land of Ireland.

SHE is far from the land where her young hero sleeps,
And lovers are round her, sighing;
But coldly she turns from their gaze, and weeps,
For her heart in his grave is lying.

She sings the wild song of her dear native plains,
Every note which he loved awaking;
Ah, little they think who delight in her strains
How the heart of the minstrel is breaking.

He had lived for his love, for his country he died,
They were all that to life had entwined him;
Nor soon shall the tears of his country be dried,
Nor long will his love stay behind him.

Oh, make her a grave where the sunbeams rest,
When they promise a glorious morrow;
They'll shine o'er her sleep like a smile from the West,
From her own loved island of sorrow.

THE OLD FAMILIAR FACES

Charles Lamb is one of the most attractive characters in the whole history of English literature. His fame rests chiefly on his charming essays, as he gained no great distinction in poetry. Together with his sister Mary, he wrote a number of poems for children, several of which appear in our pages, though the following lines in blank verse cannot be described as juvenile poetry. The sentiment which they convey, however, is so human and so universal—the pathos of looking in vain for "the old familiar faces" when one has lived through the long years, lingering after one's friends have all departed—that they really appeal to "children of all ages."

I HAVE had playmates, I have had companions,
In my days of childhood, in my joyful schooldays—
All, all are gone, the old familiar faces.

I have been laughing, I have been carousing,
Drinking late, sitting late, with my bosom cronies—
All, all are gone, the old familiar faces.

I loved a love once, fairest among women,
Closed are her doors on me, I must not see her—
All, all are gone, the old familiar faces.

I have a friend, a kinder friend has no man.
Like an ingrate, I left my friend abruptly;
Left him, to muse on the old familiar faces.

Ghost-like, I paced round the haunts of my childhood.
Earth seem'd a desert I was bound to traverse,
Seeking to find the old familiar faces.

Friend of my bosom, thou more than a brother,
Why wert not thou born in my father's dwelling?
So might we talk of the old familiar faces.

How some they have died, and some they have left me,
And some are taken from me; all are departed;
All, all are gone, the old familiar faces.

CUDDLE DOON

One of the finest poems of childhood, "Cuddle Doon," derives not a little of its beauty from the quaint Scots tongue in which it is written. It is just a simple picture of what happens every night in millions of homes. Many of the words are peculiar to Scotland and the north of England. "Muckle faught" means much noise or disturbance; "waukrife" means wakeful; "hap" is to cover up; "kittlin'" is the Scots for tickling; to "steek" the door is to shut and bolt it; to "straik each croon" is to stroke each head or crown; "quaten doon" is to quieten down; "ilka ane" means each one, and "pow" is, of course, a head, or, more correctly, the top of the head. Alexander Anderson, whose fame rests almost entirely on this one gem of Scottish poetry, was a working man employed on the railway in Scotland, and his verses were written over the signature of "Surfaceman." Born at Kirkconnel, Dumfriesshire, on April 30, 1845, he eventually became, thanks to his poetic gifts and his self-application to literary studies, librarian to Edinburgh University, where he remained until his death, in 1909.

THE bairnies cuddle doon at nicht
Wi' muckle faught an' din;
"Oh, try and sleep, ye waukrife rogues,
Your faither's comin' in."
They never heed a word I speak;
I try to gie a froon;
But aye I hap them up an' cry,
"Oh, bairnies, cuddle doon!"

Wee Jamie wi' the curly heid—
He aye sleeps next the wa'—
Bangs up an' cries, "I want a piece,'
The rascal starts them a'.
I rin an' fetch them pieces, drinks,
They stop awee the soun',
Then draw the blankets up an' cry,
"Noo, weanies, cuddle doon!"

But ere five minutes gang, wee Rab
Cries out, frae 'neath the claes,
"Mither, mak' Tam gie ower at ance,
He's kittlin' wi' his taes."
The mischief's in that Tam for tricks,
He'd bother half the toon;
But aye I hap them up an' cry,
"Oh, bairnies, cuddle doon!"

At length they hear their faither's fit,
An', as he steeks the door,
They turn their faces to the wa',
While Tam pretends to snore.
"Hae a' the weans been gude?" he asks,
As he pits aff his shoon;
"The bairnies, John, are in their beds,
An' lang since cuddled doon."

An' just afore we bed oorsel's,
We look at our wee lambs,
Tam has his airm roun' wee Rab's neck,
And Rab his airm roun' Tam's.
I lift wee Jamie up the bed,
An' as I straik each croon,
I whisper, till my heart fills up,
"Oh, bairnies, cuddle doon!"

The bairnies cuddle doon at nicht,
Wi' mirth that's dear to me;
But soon the big warl's cark an' care
Will quaten doon their glee.
Yet, come what will to ilka ane,
May He who rules aboon,
Aye whisper, though their pows be bald,
"Oh, bairnies, cuddle doon!"

COMMON NATURES

Aaron Hill, the writer of these lines, was born in 1685, and died in 1750. He was famous in his day as a poet and playwright, but has long since been forgotten except for such occasional quotations from his writings as the little poem we give here.

TENDER-HANDED stroke a nettle,
And it stings you for your pains;
Grasp it like a man of mettle,
And it soft as silk remains.

'Tis the same with common natures:
Use them kindly, they rebel;
But be rough as nutmeg-graters,
And the rogues obey you well.

DISPUTE BETWEEN NOSE AND EYES

William Cowper in this quaint little poem would seem to be having a sly dig at the lawyers, for there can be no doubt that the decision of Baron Ear is distinctly absurd, being based on the arguments of Lawyer Tongue, who, having used all his skill in pleading the case of Nose, had, unfortunately, left himself without a good case for Eyes.

BETWEEN Nose and Eyes a strange contest arose,
The spectacles set them unhappily wrong;
The point in dispute was, as all the world knows,
To which the said spectacles ought to belong.

So Tongue was the lawyer, and argued the cause
With a great deal of skill, and a wig full of learning,
While chief Baron Ear sat to balance the laws,
So famed for his talent in nicely discerning.

"In behalf of the Nose, it will quickly appear,
And your lordship," he said, "will undoubtedly find
That the Nose has had spectacles always in wear,
Which amounts to possession—time out of mind."

Then holding the spectacles up to the court—
"Your lordship observes they are made with a straddle,
As wide as the ridge of the Nose is—in short,
Designed to sit close to it, just like a saddle.

"Again, would your lordship a moment suppose
('Tis a case that has happened, and may be again),
That the visage or countenance had not a Nose,
Pray who would, or who could, wear spectacles then?

"On the whole it appears, and my argument shows,
With a reasoning the court will never condemn,
That the spectacles plainly were made for the Nose,
And the Nose was as plainly intended for them."

Then shifting his side (as a lawyer knows how)
He pleaded again in behalf of the Eyes;
But what were his arguments few people know,
For the court did not think they were equally wise.

So his lordship decreed with a grave, solemn tone,
Decisive and clear, without one "if" or "but,"
That, whenever the Nose put his spectacles on,
By daylight, or candle-light, Eyes should be shut.

THE CASTLE-BUILDER

Famous among the writers of France is Jean de Lafontaine, born 1621, died 1695. Although an idle and good-for-nothing sort of fellow, he was a writer of great and original gifts. He is best remembered for his fables in verse, which have often been translated into English, and a typical example of which is here given. Every boy and girl is, no doubt, familiar with the "moral" of this fable, which is just the old saying, "Never count your chicks before they're hatched."

It happened on a summer's day,
A country lass as fresh as May,
Decked in a wholesome russet gown,
Was going to the market town;
So blithe her looks, so simply clean,
You'd take her for a May-day queen;
Though for her garland, says the tale,
Her head sustained a loaded pail.
As on her way she passed along,
She hummed the fragments of a song;
She did not hum for want of thought—
Quite pleased with what to sale she brought,
She reckoned by her own account,
When all was sold, the whole amount.
Thus she—"In time this little ware
May turn to great account with care:
My milk being sold for—so and so,
I'll buy some eggs as markets go,
And set them; at the time I fix,
These eggs will bring as many chicks;
I'll spare no pains to feed them well;
They'll bring vast profit when they sell.
With this, I'll buy a little pig,
And when 'tis grown up fat and big,
I'll sell it, whether boar or sow,
And with the money buy a cow:
This cow will surely have a calf,
And there the profit's half in half;
Besides, there's butter, milk, and cheese,
To keep the market when I please:
All which I'll sell, and buy a farm,
Then of sweethearts have a swarm.
Oh, then for ribands, gloves, and rings!
Ay, more than twenty pretty things—
One brings me this, another that,
And I shall have—I know not what!"
Fired with the thought, the sanguine lass,
Of what was thus to come to pass.
Her heart beat strong; she gave a bound,
And down came milkpail on the ground:
Eggs, fowl, pig, hog (ah, well-a-day!)
Cow, calf, and farm—all swam away!

BEAUTIFUL THINGS

This little poem by Ellen P. Allerton tells us that true beauty lies in something more than loveliness of form and face.

Beautiful faces are those that wear—
It matters little if dark or fair—
Whole-souled honesty printed there.

Beautiful eyes are those that show,
Like crystal panes, where hearth-fires glow,
Beautiful thoughts that burn below.

Beautiful lips are those whose words
Leap from the heart like songs of birds,
Yet whose utterance prudence girds.

Beautiful hands are those that do
Work that is earnest, and brave, and true,
Moment by moment, the long day through.

Beautiful feet are those that go
On kindly ministries to and fro,
Down lowliest ways, if God wills it so.

Beautiful shoulders are those that bear
Ceaseless burdens of homely care,
With patient grace and daily prayer.

Beautiful lives are those that bless—
Silent rivers of happiness,
Whose hidden fountains but few may guess.

Beautiful twilight at set of sun;
Beautiful goal, with race well won;
Beautiful rest, with work well done.

Beautiful graves, where grasses creep,
Where brown leaves fall, where drifts lie deep
Over worn-out hands—oh, beautiful sleep!

WHAT BOBBIE WOULD LIKE

By permission of Mr. Frederic E. Weatherly we are able to read here these pretty verses from the pen of that famous song-writer, who, although he has written so much for the grown-ups, takes pleasure every now and then in turning his pen to write of childhood and children's thoughts.

I'd like to be a farmer,
With lots of stacks and mows,
And fowls and pigs, and carts and gigs,
And four-and-twenty cows.
I'd drive them all to market,
On summer mornings fine;
"Oh, come and buy," I'd stand and cry,
"Buy, buy, good masters mine!"
But if they would not buy them,
It would not give me pain;
I'd simply say: "Fair sirs, good-day!"
And drive them home again.

I wish I were a farmer,
With lots of lambs and sheep,
I'd run and play with them all day,
Until we went to sleep.
I'd take the wool to market
On summer mornings fine—
"Oh, come and buy," I'd stand and cry,
"Buy, buy, good masters mine!"
But if they would not buy my wool,
It would not cause me pain,
I'd come and say: "Dear sheep, good-day,
Here is your wool again."
And if they could not put it on,
I'd put it on myself;
And all the rest, when I was drest,
I'd lay upon the shelf.
For when the winter days come round,
And all the world is cold,
I know full well my wool will sell
For all its weight in gold.
And so I'll be a farmer,
Right happy in my lot,
And he who cares may buy my wares,
And other folk need not!

THE CAGED BIRD

These lines are by William Lisle Bowles, a clergyman and poet of great distinction in his day, whose poems were admired by such great writers as Coleridge and Wordsworth. His works are now little read, and are familiar only to literary students. He was born in 1762 and died in 1850.

Oh, who would keep a little bird confined
When cowslip bells are nodding in the wind,
When every hedge as with "good-morrow" rings,
And, heard from wood to wood, the blackbird sings?
Oh, who would keep a little bird confined
In his cold wiry prison?—Let him fly,
And hear him sing: "How sweet is liberty!"

LITTLE VERSES FOR VERY LITTLE PEOPLE

The writing of nursery rhymes is by no means so easy as one might imagine. Perhaps that is why so few good rhymes, which are really worth calling nursery rhymes, are written nowadays. When people think things are easy to do, they are apt to neglect them, or to do them in a slipshod way. But Miss Laurence Alma-Tadema, who is a daughter of Sir Lawrence Alma-Tadema, the celebrated painter, has wisely thought it worth while to write nursery rhymes well, and, as a result, we have had many charming little verses of this kind from her pen. A selection from these is given on this page and the next. Like all that she has written, they have real musical movement in them, and, indeed, many of her poems for little folk have been set to music with great success.

MARCH MEADOWS

A Lark

Lark-bird, lark-bird soaring high,
Are you never weary?
When you reach the empty sky,
Are the clouds not dreary?
Don't you sometimes long to be
A silent goldfish in the sea?

Goldfish, goldfish diving deep,
Are you never sad, say?
When you feel the cold waves creep,
Are you really glad, say?
Don't you sometimes long to sing
And be a lark-bird on the wing?

Lambs

O little lambs! the month is cold,
The sky is very gray;
You shiver in the misty grass
And bleat all the winds that pass;
Wait! when I'm big—some day—
I'll build a roof to every fold.

But now that I am small, I'll pray
At mother's knee for you;
Perhaps the angels with their wings
Will come and warm you, little things;
I'm sure that, if God knew,
He'd let the lambs be born in May.

A TWILIGHT SONG

Baby moon, 'tis time for bed,
Owlet leaves his nest now;
Hide your little horned head
In the twilight west now;
When you're old and round and bright
You shall stay and shine all night.

Baby girl is going, too,
In her bed to creep now;
She is little, just like you,
Time it is to sleep now;
When she's old and tired and wise,
She'll be glad to close her eyes.

THE NESTING HOUR

Robin-friend has gone to bed,
Little wing to hide his head—
Mother's bird must slumber, too,
Just as baby robins do—
When the stars begin to rise,
Birds and babies close their eyes

PLAYGROUNDS

In summer I am very glad
We children are so small,
For we can see a thousand things
That men can't see at all.

They don't know much about the moss
And all the stones they pass;
They never lie and play among
The forests in the grass.

They walk about a long way off;
And, when we're at the sea,
Let father stoop as best he can
He can't find things like me.

But, when the snow is on the ground
And all the puddles freeze,
I wish that I were very tall,
High up above the trees.

THE NEW PELISSE

Baby's got a new pelisse,
Very soft and very neat—
Like a lammy in her fleece
She's all white from head to feet.

Thirty lambs each gave a curl,
Mother sewed them, stitch by stitch—
All to clothe a baby-girl:
Don't you think she's very rich?

THE LITTLE SISTER

Bath-time

Baby's got no legs at all;
They're soft and pinky, crumpled things.
If he stood up he'd only fall;
But then, you see, he's used to wings.

Bed-time

Baby, baby, bye,
Close your little eye!
When the dark begins to creep,
Tiny-wees must go to sleep.

Lammy, lammy, lie,
I am seven, I;
Little boys must sleep and wait,
If they want their bed-time late.

Fidgy, fidgy, fie,
There's no need to cry!
Soon you'll never dress in white,
But sit up working half the night.

IF NO ONE EVER MARRIES ME

If no one ever marries me—
And I don't see why they should;
For nurse says I'm not pretty,
And I'm seldom very good—

If no one ever marries me,
I shan't mind very much;
I shall buy a squirrel in a cage,
And a little rabbit hutch.

I shall have a cottage near a wood,
And a pony of my own,
And a little lamb quite neat and clean
That I can take to town.

And when I'm getting really old,
At twenty-eight or nine,
I shall buy a little orphan girl
And bring her up as mine.

KING BABY ON HIS THRONE

King Baby on his throne
Sits reigning O, sits reigning O!
King Baby on his throne
Sits reigning all alone.

His throne is mother's knee,
So tender O, so tender O!
His throne is mother's knee,
Where none may sit but he.

His crown it is of gold,
So curly O, so curly O!
His crown it is of gold,
In shining tendrils rolled.

His kingdom is my heart,
So loyal O, so loyal O!
His kingdom is my heart,
His own in every part.

Divine are all his laws,
So simple O, so simple O!
Divine are all his laws,
With love for end and cause.

King Baby on his throne
Sits reigning O, sits reigning O!
King Baby on his throne
Sits reigning all alone.